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Telephone ENGINEER and MANAGEMENT

MAY, 1945

Featuring

Management in the Operating Telephone Company

By
JOHN R. PORTER, Pres.
Carolina Tel. & Tel. Co.

•

THE COVER PICTURE—
Getting messages through on Okinawa, U. S. Signal Communication men utilize existing Japanese facilities in stringing wire through town of Hisa. Signal Corps photo.

•

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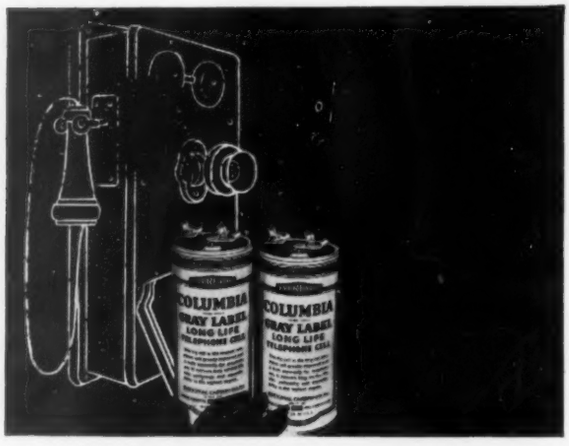
THE MAGAZINE OF THE TELEPHONE INDUSTRY

LET LEICH SERVICE FIT INTO YO
FOR DEPENDABLE MAINTENANCE SUPPLIES TODAY

TO YOUR FUTURE
FOR ENDURING CONSTRUCTION MATERIALS TOMORROW
Leich Sales Corporation 427 W. RANDOLPH ST., CHICAGO 6, ILLINOIS

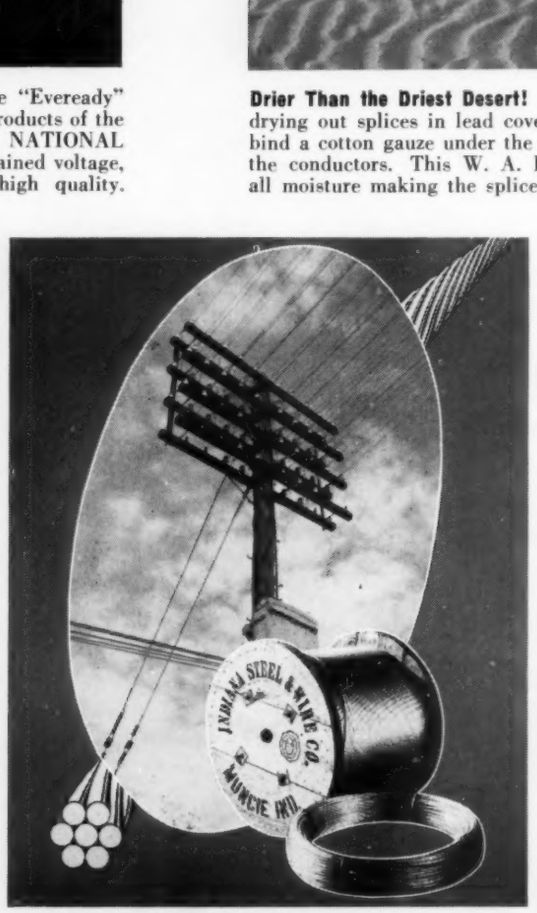
Glass Outlasts Wood! Despite winter cold snaps, spring thaws and summer heat waves, Hemingray Insulators regularly outlast telephone poles. Made by OWENS-ILLINOIS GLASS CO., these fine quality insulators are recognized by telephone men everywhere as the standard of the industry.



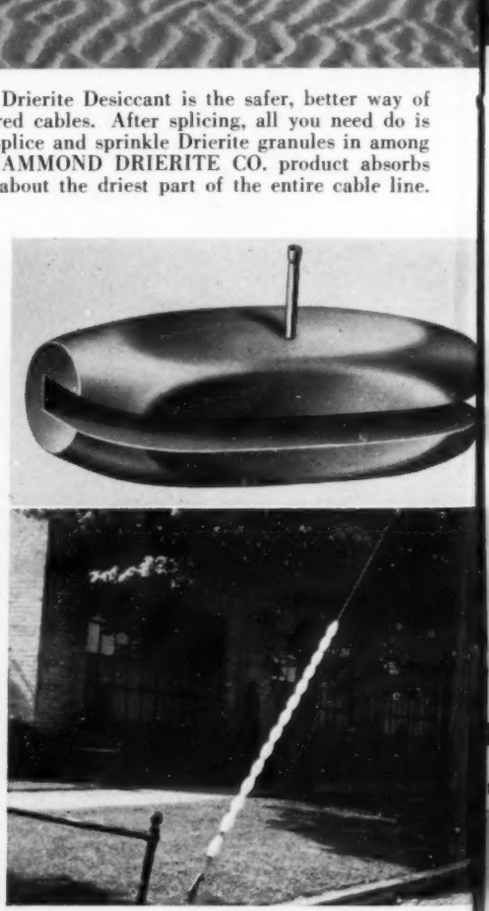
You Can Reduce Replacements when you use "Eveready" "Columbia" "Gray Label" Telephone Cells. Products of the world's largest dry battery laboratory at NATIONAL CARBON CO., INC., they are famous for sustained voltage, extra hours of service life, and uniform high quality.

Drier Than the Driest Desert! Drierite Desiccant is the safer, better way of drying out splices in lead covered cables. After splicing, all you need do is bind a cotton gauze under the splice and sprinkle Drierite granules in among the conductors. This W. A. HAMMOND DRIERITE CO. product absorbs all moisture making the splice about the driest part of the entire cable line.

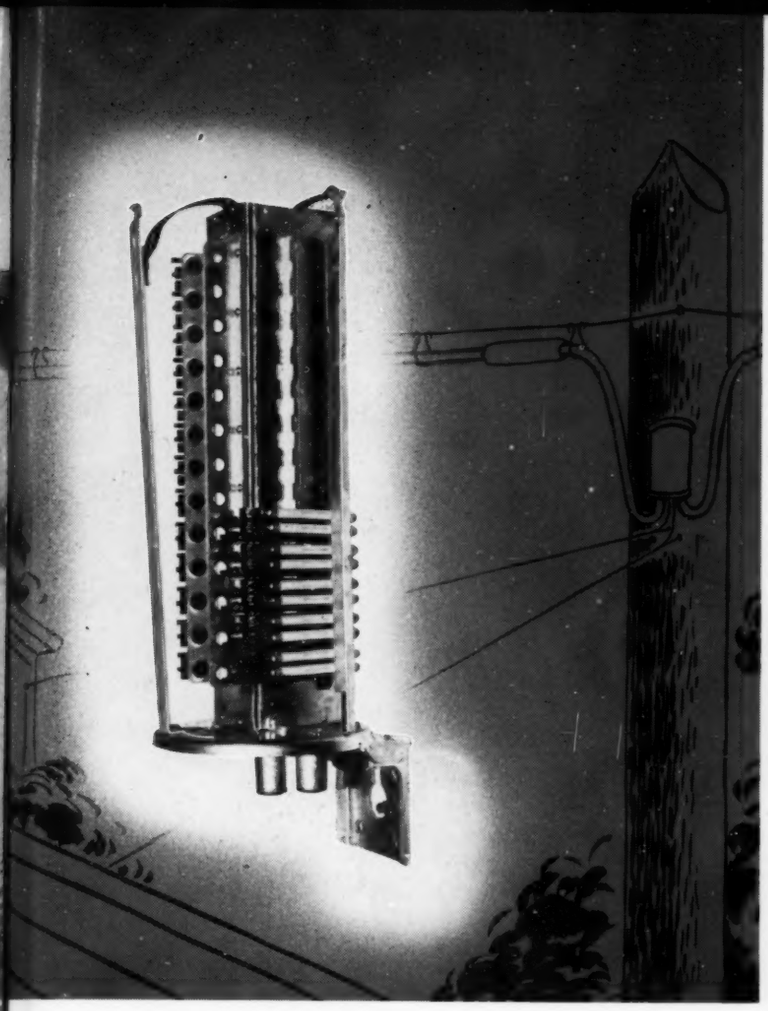
Exceptional Strength is one important reason why Ironite Drop Wire stands unusual strains with complete safety. What's more, Ironite is "armored" to provide extra protection against the elements. Made by PARAGON ELECTRIC CO., it has great strength, high conductivity, economy.



The Time-Tested Steel Strand. A heavy, ductile, tightly-adherent coating of zinc, applied by the famous Crapo Galvanizing Process, provides lasting protection against corrosion in Indiana Crapo Steel Strand. Made by INDIANA STEEL & WIRE COMPANY, its rugged strength helps to minimize maintenance expenses.

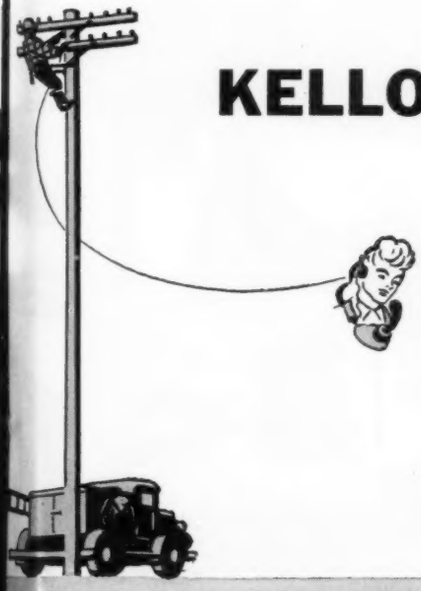


Shock-Absorbing "Spot-light"! Flexibal is a sensible guy guard. Made of short sections of wood, it absorbs impacts, prevents damage to itself or the striking object. Aluminum coated, it is highly visible both day and night. Installation of this S. E. OVERTON product is extremely simple.



Nothing to It! Trouble shooting and transmission testing are greatly simplified when long cable runs are sectionalized. Use the COOK ELECTRIC CO. UA-20 Cable Terminal. To open cable pairs, all you do is remove fuses. This permits easy testing in either direction. With capacity for 51 pairs, the UA-20, terminal provides highly effective lightning, power cross and station protection.

Modern Inside and Out! For the telephone industry's special needs, Philco provides a complete line of storage batteries ranging from 10 A.H. to 1680 A.H. capacity. Available in steel glass, rubber and Vitrabloc jars, all incorporate the famous PHILCO Floté element, which eliminates low cells in full float service, and has widely demonstrated its efficient performance.



KELLOGG Recommends and Guarantees These Finer Supplies

. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

KELLOGG SWITCHBOARD & SUPPLY COMPANY

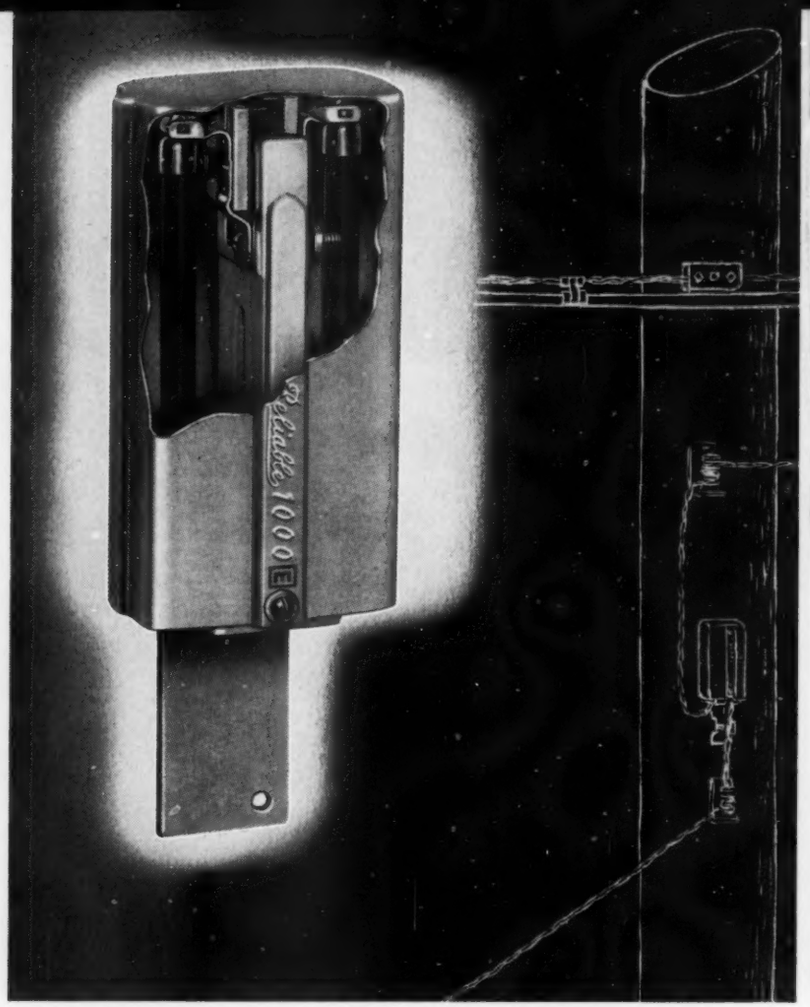
Factory and General Offices: 6650 South Cicero Avenue, Chicago 38, Illinois

Branch Offices: Kansas City San Francisco St. Paul Los Angeles

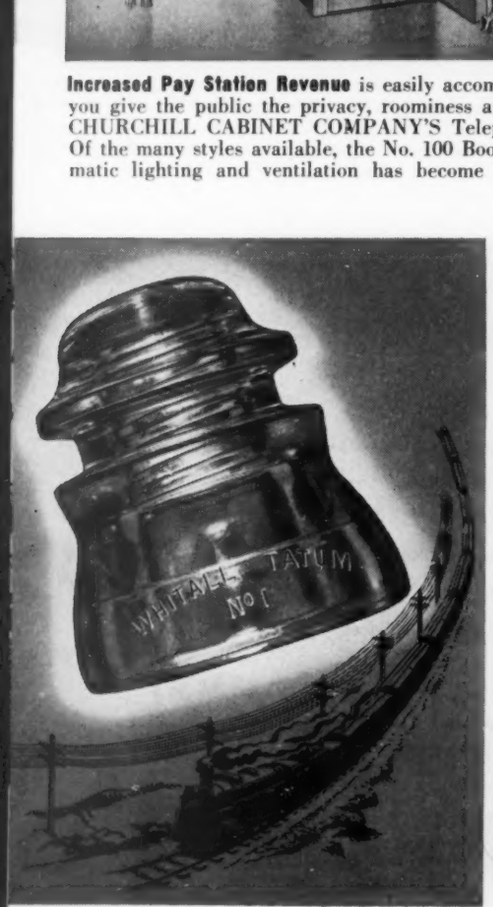
Order Your Line Supplies from KELLOGG

Cuts Maintenance and Installation Costs. The Neale Cable Spinner, made by CABLE SPINNING EQUIPMENT CO., tightly lashes cable and support together with a spirally applied wire. Cable won't move or vibrate. This method has been favorably reported on by the USITA Plant Committee.

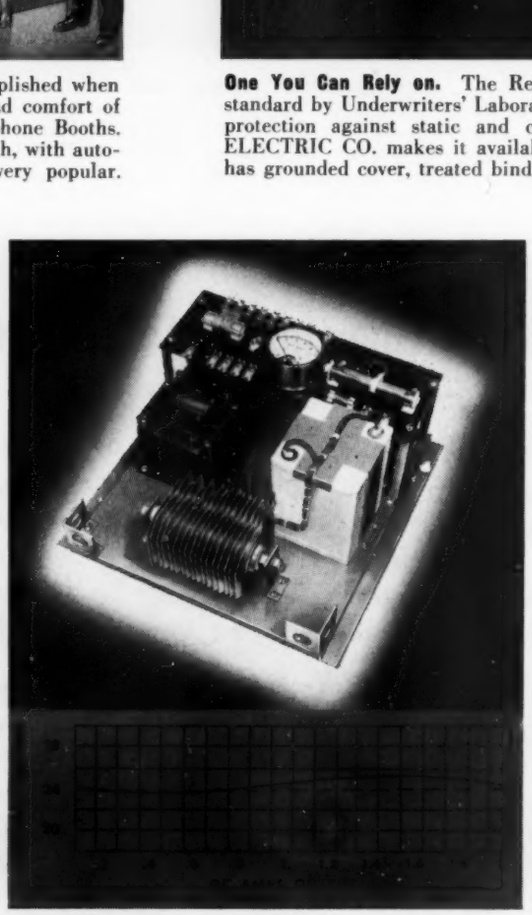
Increased Pay Station Revenue is easily accomplished when you give the public the privacy, roominess and comfort of CHURCHILL CABINET COMPANY'S Telephone Booths. Of the many styles available, the No. 100 Booth, with automatic lighting and ventilation has become very popular.



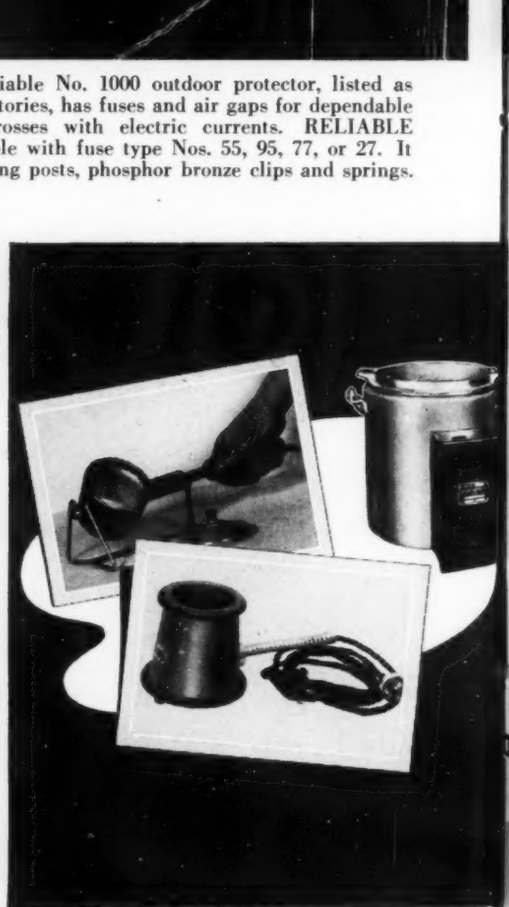
One You Can Rely on. The Reliable No. 1000 outdoor protector, listed as standard by Underwriters' Laboratories, has fuses and air gaps for dependable protection against static and crosses with electric currents. RELIABLE ELECTRIC CO. makes it available with fuse type Nos. 55, 95, 77, or 27. It has grounded cover, treated binding posts, phosphor bronze clips and springs.



Meet Every Service Need. That's why so many telephone companies use Armstrong's Whitall Tatum Insulators, made by ARMSTRONG CORK COMPANY. Some of their outstanding features are crystal clarity of glass, accurate gaging, and unusual resistance to temperature changes.



Steady DC Voltage, required by switchboard lamps and telephones (especially dial), is one thing you can be assured of when you use a RectiFilteR. Made by RAYTHEON MANUFACTURING COMPANY, it operates from regular AC source. And because there are no moving parts to wear, maintenance is low.



The Right Tool for Every Job. That's the formula that lets your men do better work. Typical of VULCAN ELECTRIC CO.'s quality products, designed expressly for this purpose, are the Electric Pouring Ladle, the Special Wax Melting Pot, and the No. "1700 Series" Solder Melting Pot.

Sealed Against Trouble. Leading manufacturers of communication equipment rely on Kester Rosin-Core Solder to eliminate high-resistance joints and intermittent open-and-closed circuits. Made by KESTER SOLDER CO., it permanently seals joints and protects them against service troubles. For good, long-lasting, dependable connections, always rely on Kester Rosin-Core Solder.

Alike as Peas in a Pod. Uniform high quality is the distinctive characteristic of all Knobs and Tubes made by PORCELAIN PRODUCTS, INCORPORATED. You can go through a million of them, and find that every one is the exact duplicate of every other. Such uniform high quality is the result of their high precision manufacture and thorough inspection in the laboratory.

KELLOGG Recommends and Guarantees These Finer Supplies

. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

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For Exceptional Wire Performance

ALIKE IN TOP PERFORMANCE VALUE are these 5 Roebling telephone wires and cables . . . to include in your modernization plans for tomorrow . . . because they're proving their worth today. Built to handle tough jobs, their lasting, dependable service reduces maintenance costs . . . by eliminating frequent replacements in your telephone circuits.

BORN OF ROEBLING SKILL acquired by a century of wire-making experience . . . bred in up-to-date manufacturing methods . . . these products combine with an outstanding record of servicing telephone company requirements . . . to assure you exceptional wire performance.

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WIRE ROPE AND STRAND • FITTINGS • SLINGS COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • SUSPENSION BRIDGES AND CABLES • WIRE CLOTH AND NETTING • ELECTRICAL WIRES AND CABLES • AERIAL WIRE ROPE SYSTEMS AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

You have probably noticed the loose leaf 4-color Spectrum Chart enclosed in this issue. It is an Editorial Supplement that we feel will be very valuable to our readers. It is obviously quite an expense for a publication of our size to go into full color reproduction for our contents but in this case we felt the chart of such significance that we threw precedence to the winds to do a better job for our readers. Those taking the Radio Course for Telephone Men will find the chart particularly valuable. As you see, the Chart is suitable for framing.

V-E

Limitation Orders U-8 (the prohibition against manufacture of civilian telephone sets) and U-5 (which required all communications manufacturers to get priority rating of AA-5 or higher for civilian apparatus and equipment) have been lifted in their entirety. Drastic revisions of Order U-2, the order for telephone service installations, are discussed in this issue. Complete Text of the Revised U-2 is carried. The way is now open, as soon as our manufacturers complete their war work, to place into effect the postwar plans you have been making. The equipment manufacturers will announce through our columns when they are able to furnish the materials.

V-E

V-E made it two down and one to go. 7th War Loan Drive enables you to do your "shooting" on the home front. R.W.S.

TELEPHONE ENGINEER AND MANAGEMENT

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Founded in 1909

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FOR SWITCHBOARD OPERATORS

Harter Posture Chair No. 1RSBC. Seat height adjustable 17" to 22"

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The seated comfort of switchboard operators is essential to efficient telephone service. Harter Posture Chairs insure comfort by encouraging correct posture.

The back rest and seat height adjustments on every Harter Posture Chair are made quickly and easily to the individual requirements of each operator. These adjustments provide the restful support which permits natural weight distribution.

We are now permitted to manufacture a complete line of Steel Posture Chairs for switchboard use. They are durably constructed of steel, attractively upholstered, and finished in baked enamel — gray, green or brown. **You do not need a priority to obtain these chairs. Simply specify "for switchboard use" on your order or inquiry.**

Write today for complete information about models and prices. Dept. E, Harter Corporation, Sturgis, Michigan.

HARTER

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Buy More War Bonds

BUILT FOR COMFORT — TO INCREASE EFFICIENCY

Thermoplastic insulation specialists . . . producing a complete line from fine wires to heavy power cables . . . serving: Public Utilities, Radio, Electronic, Appliance and Instrument Manufacturers, Telephone Companies and Contractors.

Now

THERMOPLASTIC INSULATION

Nothing is constant but change . . . and in the wire and cable field the "change" to thermoplastic insulation has been tried and proved in the test tube of war. When victory is won you will demand the maximum resistance which these new compounds and constructions offer to heat, flame, oxidation, chemical action, oil, grease, moisture, cold, abrasion, fungus growth and other severe conditions. Write NOW for complete information and samples engineered to your particular requirements. Remember . . . when you're thinking of PLASTIC you're thinking of US!

PLASTIC

WIRE & CABLE *NORWICH CONN*

CORPORATION

LENZ HAND SET CORDS

LOOK FOR LENZ THIS MARK OF QUALITY

REACHING NEW HEIGHTS

LENZ engineers are constantly striving for new heights of perfection in the manufacture of Telephone Cords, Wire and Cable.

For instance: New materials and improved manufacturing methods have resulted in better Hand Set Cords. Longer wearing braids assure greater economy. Stronger tinsel conductors maintain highest transmission efficiency. LENZ type of construction offers greatest flexibility.

Subscriber satisfaction is still important—Specify LENZ. Write today for complete information.

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1751 N. WESTERN AVE., CHICAGO 47, ILL., U. S. A.

"IN BUSINESS SINCE 1904"

"TRAINED" TO LOOK FOR WATER!

Protek-Sorb* desiccant's specially-processed small mesh size gives it the ability to penetrate every nook and cranny of the open splice. It flows around the wires—gets in the smallest spaces . . . seeking out and adsorbing moisture. *No open space in the splice is too small for it to penetrate.*

Couple this with its extremely high capacity for moisture and there are your reasons why splices dried with Protek-Sorb desiccant are **DRIED MORE COMPLETELY** and **DRIED FASTER.** No wonder many leading telephone companies use and recommend Protek-Sorb desiccant.

Your regular telephone jobber stocks Protek-Sorb desiccant . . . *all you need to do is to ask for it.*

*Reg. U. S. Pat. Off.

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Canadian exclusive sales agents for PROTEK-SORB desiccant: CANADIAN INDUSTRIES LIMITED, General Chemicals Division

"SHOOTING IT OUT"
in the high Sierras

EVERY telephone engineer has an earful of tough-assignment stories he likes to tell. And the men who laid the 2000 miles of underground cable from Omaha to Sacramento have a Superman thriller for nearly every mile. "The toughest job," said one engineer, "was when we went over the Donner Summit in the high Sierras." The cable was laid in solid lava rock, and "we made a trench by exploding 26,000 dynamite shots, one every twelve inches."

During these high-pressure times, telephone workers—in every department—are facing many trying situations, working against odds, but winning through with amazing success. They are living up to the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
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UP-TO-DATE FOR 52 YEARS

MODEL NO. 6
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MANUFACTURERS of modern toll telephone switchboards incorporate Calculagraphs into their designs.

They know that these instruments will provide the essential data for charging Long Distance calls—ACCURATELY AND QUICKLY—to the telephone company users of their equipment.

Calculagraphs, used by the principal telephone companies throughout the world, are helping in an important way to handle the present very heavy toll traffic.

● *Photograph of switchboard, equipped with the Calculagraph, courtesy of The North Electric Manufacturing Company.*

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Incorporated 1892

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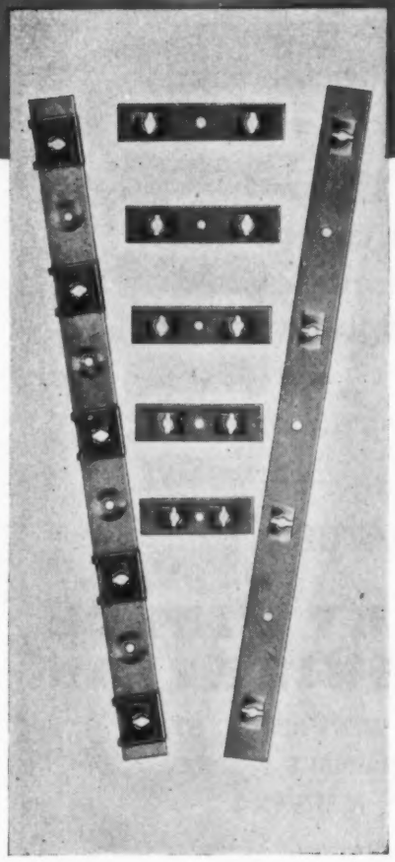
TWIN AND MULTIPLE SPEED NUTS

YOU CAN'T BEAT THIS *Combination!*



Twin and Multiple SPEED NUTS COMBINE Fasteners into One Unit!

● Individual SPEED NUTS offer tremendous advantages over ordinary fasteners, but Twin and Multiple SPEED NUTS go even further. They COMBINE two or more SPEED NUTS into one unit to simplify, reinforce and speed up multiple fastening attachments.

Twin type SPEED NUTS are available with ½" to 1" hole spacings, for machine or sheet metal screws. Center hole permits riveting in place for blind location assembly.

Multiple type SPEED NUTS are available, with 1" to 2" hole spacings, for 6Z, 8Z or 10Z sheet metal screws. Supplied in any desired lengths or in coils. Made of spring steel for riveting in blind location, or stainless steel for welding.

Where "float" is necessary to compensate for unavoidable misalignment of holes, SPEED NUT Retainer Strips are recommended, as shown in panel at left. Here self-retaining "U" type SPEED NUTS are slipped over aluminum or stainless steel strips, in "floating" register with the screw holes.

In writing for samples, please give screw size and hole spacing.

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In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario.
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Speed Nuts PATENTED * Trade Mark Reg. U. S. Pat. Off.

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Phillips electrical conductors and communication equipment flow in a continuous stream out of the Phillips factories, to aid in the war effort of the United Nations. Some are serving in Canada's industrial plants. Some are going into the fighting equipment these plants produce. And other Phillips products are leaving Canada to serve, around the world, at countless places where the allies are meeting the common foe.

Wherever they are called upon to serve, Phillips products are confirming their reputation for quality. And after these war-time tasks are completed, Phillips products will again be available for peacetime uses throughout the world—offered through the globe-circling distribution facilities of International Automatic Electric Corporation and its subsidiaries.

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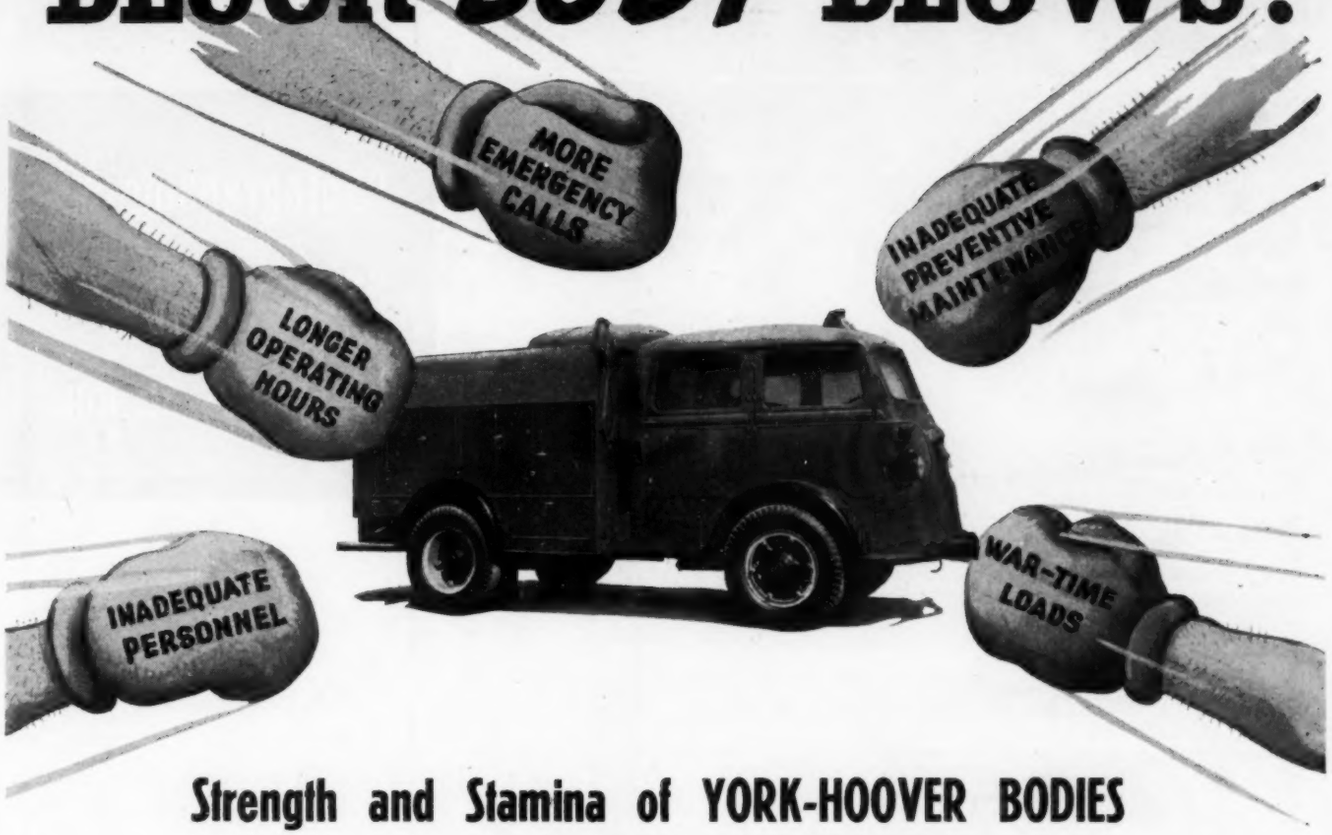
BLOCK *BODY* BLOWS!



Strength and Stamina of YORK-HOOVER BODIES Save TIME, MONEY and MANPOWER

The inherent strength and stamina of York-Hoover Public Utility Bodies combat excessive body blows on both the war and home fronts.

Whether it be a small service unit for emergency repair, a ladder job for overhead work, or a heavy duty line construction body with complete equipment, the same sturdy construction facilitates better body service—way beyond the normal depreciation period.

Since the advent of the motor truck, York-Hoover engineers—men skilled in the art of solving body problems — have designed and built thousands of bodies that provide constant, trouble-free operation.

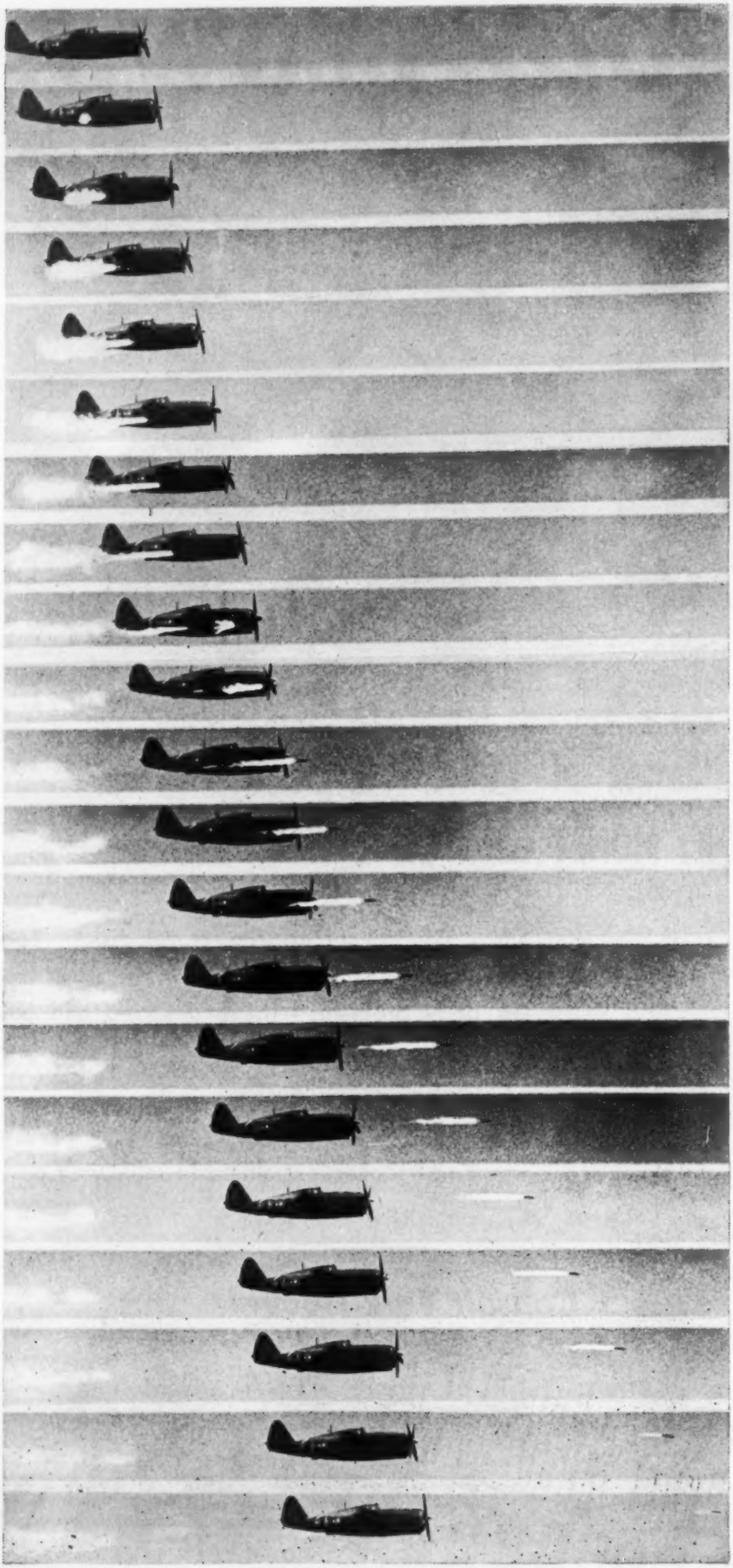
This accumulated "know how" is a sound reason why York-Hoover is qualified to solve your problem and give you better body service . . .

Be "Body-Wise"! Consult York-Hoover

BODY DIVISION

YORK-HOOVER CORPORATION

YORK, PENNSYLVANIA



Succession pictures taken by a "ribbon frame" camera, showing a wing rocket getting under way and speeding toward the enemy at about 13 miles a minute. This camera was developed by Bell Telephone Laboratories.

Photographing a ROCKET at 800 miles an hour

One outstanding weapon of this war is the rocket, now used by our fighting forces on land and sea and in the air.

Scientists at Bell Telephone Laboratories had an important part in the technical development of this American weapon. One of their contributions was the "ribbon frame" camera which takes 120 pictures a second on a continuously moving film. It has proved of great value in studying rockets and shells in flight.

The ribbon frame camera is only one of many Bell Laboratories developments which are being turned against the enemy.

Our Laboratories are now wholly devoted to the war. When it is won, they will go back to their regular job -- helping the Bell System give you the best telephone service in the world.

BELL TELEPHONE SYSTEM

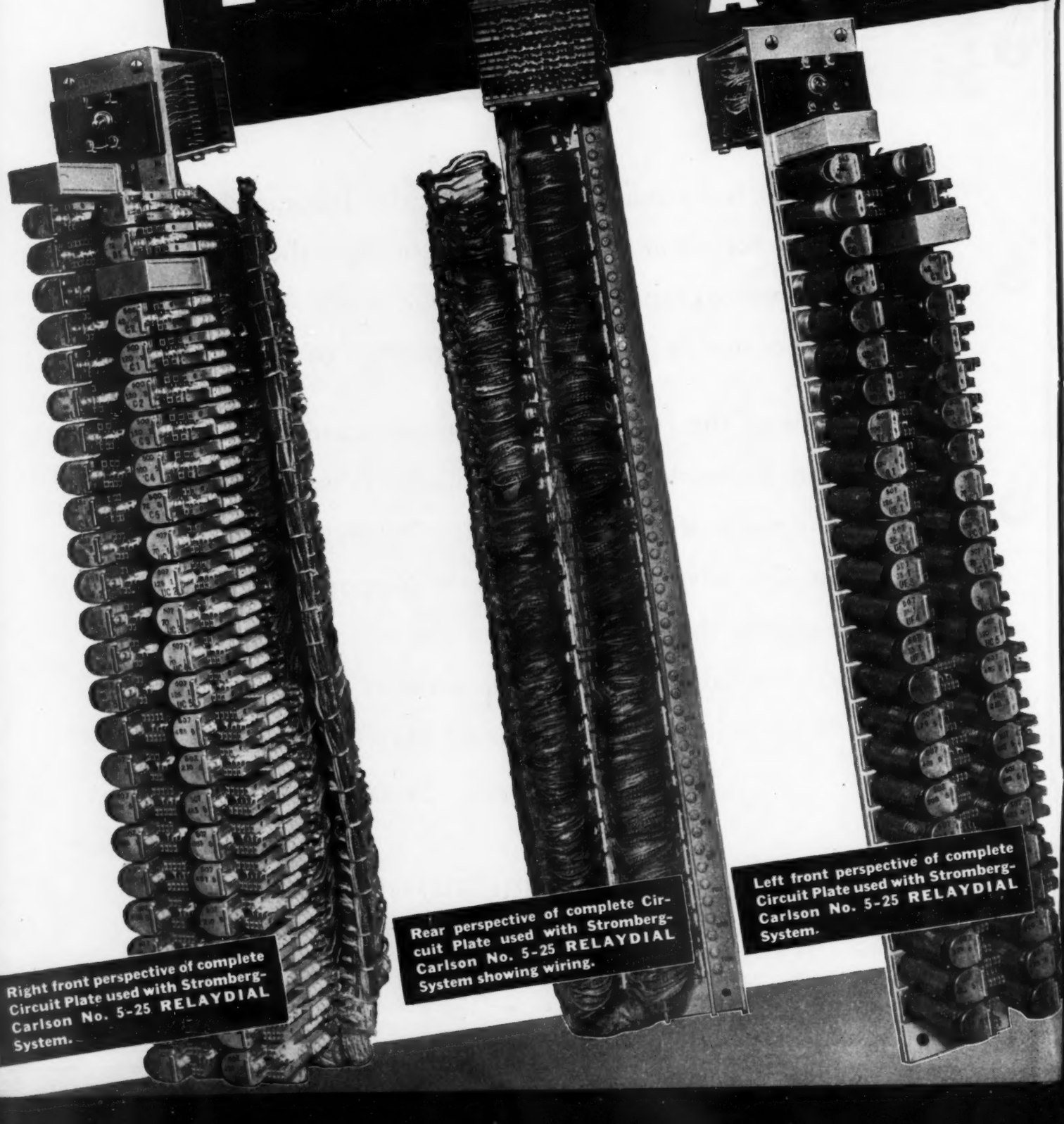
Splitting a second into 120 pictures

Some folks may wonder why the laboratories of a telephone system ever got into the field of photography. Actually, the work of Bell Laboratories involves *many* branches of science.

Few of the Laboratories' wartime achievements can be made public for security reasons. But the story of the "ribbon frame" camera, as told in the advertisement on the opposite page, suggests the broad range of research now being conducted in the nation's interests. It appears in national magazines during May.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

WORKS 168 HOURS A WEEK



Right front perspective of complete Circuit Plate used with Stromberg-Carlson No. 5-25 RELAYDIAL System.

Rear perspective of complete Circuit Plate used with Stromberg-Carlson No. 5-25 RELAYDIAL System showing wiring.

Left front perspective of complete Circuit Plate used with Stromberg-Carlson No. 5-25 RELAYDIAL System.

with nothing extra for overtime

STROMBERG-CARLSON No. 5-25 RELAYDIAL

Many telephone companies are relieving the overloads on P. B. X. switchboards in large factories, offices, and institutions by installing a Stromberg-Carlson No. 5-25 RELAYDIAL for handling strictly inter-communicating traffic.

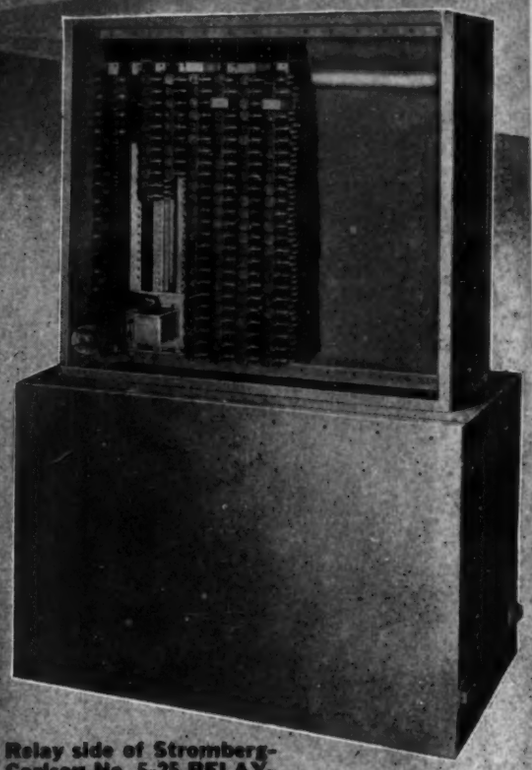
Available for use 24 hours a day, the Stromberg-Carlson No. 5-25 RELAYDIAL is a private exchange wired for 25 lines and 5 connecting links. It permits an ultimate of *five simultaneous* dial telephone conversations. Groups of individuals who have to be in frequent contact with each other can utilize this system for inter-communication without bothering the P. B. X. operator, because this traffic is handled without going through the main outlet board.

Secret service is the feature of the No. 5-25 RELAYDIAL. The station equipment for this system consists of a dial telephone, a two-way switching key, and two bell boxes. When the key is in the normal position, the telephone is connected to the RELAYDIAL system for either originating or answering inter-communicating calls. In the operative position, the telephone becomes an extension from the P. B. X. switchboard.

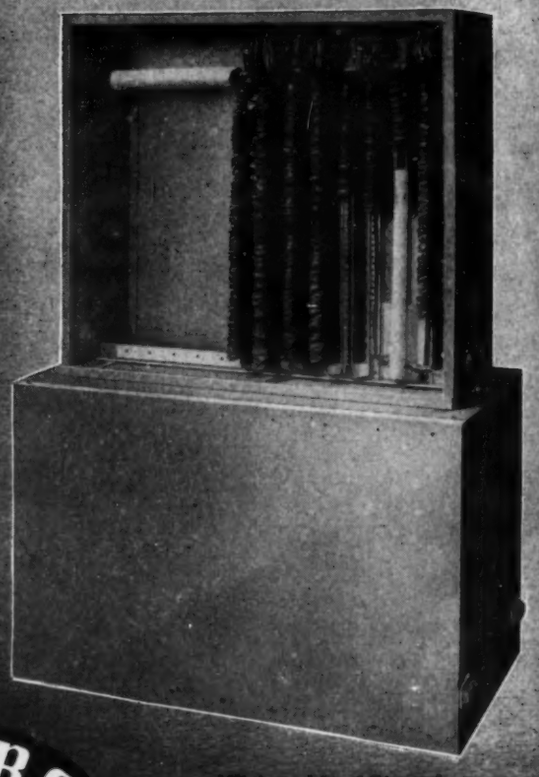
The bell boxes are equipped with different toned gongs so that the answering party can easily distinguish over which system the call is coming.

A new feature of the No. 5-25 RELAYDIAL is the circuit plate arrangement of equipment. To add additional links, a completely wired circuit plate can be installed as a unit, thereby eliminating the necessity of buying relays and doing intricate wiring.

Stromberg-Carlson No. 5-25 RELAYDIAL Systems are available to operating companies who can furnish the proper certifications. Write for complete details.



Relay side of Stromberg-Carlson No. 5-25 RELAY-DIAL System.



Wiring side of Stromberg-Carlson No. 5-25 RELAY-DIAL System.

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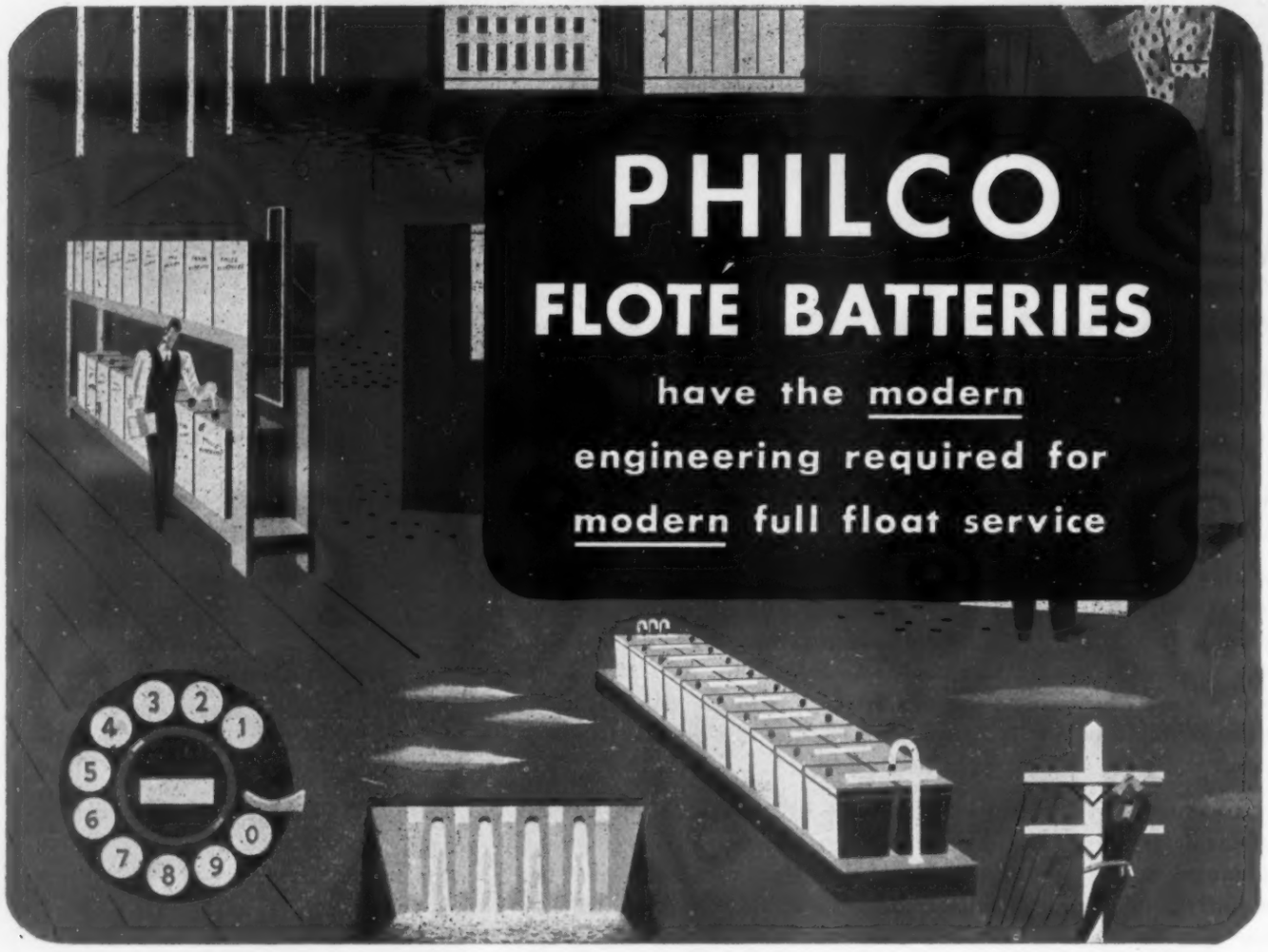
PROGRESS IN TELEPHONY

KNOCKOUT IN THE 7TH

It's been a hard fight — but we're winning it. Let's put the "KO" on Tokyo by our purchases of War Bonds in the 7th War Loan Drive.

ARMY E NAVY



THE ONLY battery specifically designed for modern full float service is Philco Floté. For this purpose, Philco engineers developed the outstanding battery improvement—the famous Philco Floté grid. The longer life and superior electrical characteristics of Philco Floté Batteries are the direct result of the special Floté grid design and the special metal in which it is cast. The Floté grid has exceptional strength and durability. It eliminates low cells. It lowers internal losses. It reduces operating and charging costs. Specify modern Philco Floté Telephone Batteries, in Steel Glass, Rubber or Vitrabloc jars. New catalogs now available. PHILCO CORPORATION, *Storage Battery Division,* Trenton 7, New Jersey. *Makers of the Famous Philco "Thirty".*

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EDITORIAL

Maybe This Is It!

EVERYONE who thinks the proposition through realizes that one important thing that is lacking in the commercial organization of this country is a method of financing small business—including small telephone companies—so that they can grow.

The commercial financing channels of the nation are built to fit big companies. That is natural; the big financing jobs are of sufficient size to make it practicable for financing people to handle them, and they are big enough to spread the risk of the investor.

But the really small company, and particularly the little individually-owned company, has no certain place to go to get long-term capital money. Even the multitude of existing government lending agencies do not in most cases provide a universally workable borrowing plan for most little businesses.

Under the Federal Farm Credit Act, for instance, some loans have been made to co-operatives for telephone purposes. But, under this Act, loans can be made only to mutual or co-operative organizations, and the majority of small independent telephone companies are not mutuals or co-ops.

The Reconstruction Finance Corporation, which lends government money for many purposes, has a plan for participating with local banks in lending money to small business, with small telephone companies eligible. But, under this plan, commercial banks must make the loan and must take at least 25% of the risk of it themselves. It is frequently as hard to get a bank to take 25% of the risk of a loan as to take it all.

Further, under this participation plan, loans are made for a maximum of ten years, and must be paid at the rate of at least one-tenth yearly during that period.

Long-term and low interest loans would be made to small telephone companies under the pending rural telephone legislation, but a large segment of the telephone industry feels that the strings tied to such loans would in the long run be harmful to the telephone industry as a whole.

The plain fact is, therefore, that while government and Congress have done and are doing a lot of talking about helping small businesses in this country, by financing them and in other ways, they have not yet created a plan, always workable, that will do the important job of financing them when they need money for long-term capital purposes.

THERE has now been introduced in the House of Representatives, however, a bill (H. R. 2994), by Representative Jennings Randolph of West Virginia, which, if enacted with perhaps some minor modifications, would, it seems, make government money available to really small businesses on terms they could afford to meet.

Representative Randolph has apparently realized that something more than all the existing government lending plans is necessary in order to really help small businesses needing capital money. His bill provides for money to be supplied direct by R.F.C. as loans to small companies, or for the purchase of preferred stock of small companies. No interest rates are fixed, but the interest would presumably be reasonably low.

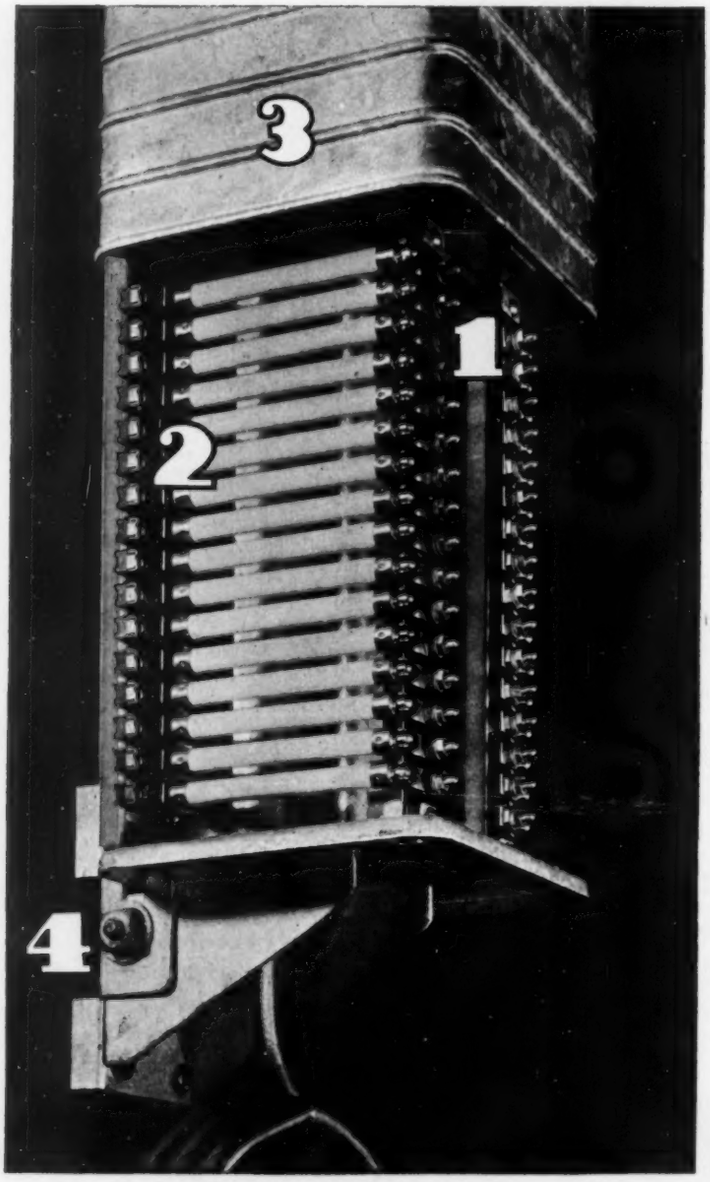
The bill provides for ten-year loans; possibly amendments allowing a longer term could be arranged, as this is a rather short time for repayment of a capital loan to a utility.

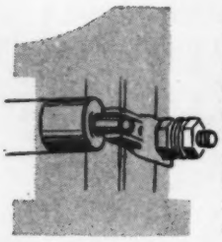
The encouraging thing about the introduction of this bill is the evidence given that there is some understanding in Congress that the present system of government loans to really small companies for capital purposes does not fill the bill.

Undoubtedly those in the Independent industry who are active in bringing about some workable system for loans to small telephone companies will give attention to the Randolph bill. It seems entirely possible that this legislation, or something similar to it, may be, if enacted, an answer to this perplexing and important problem of financing small telephone companies.

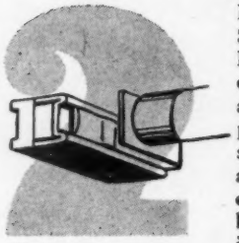
Reliable *because....*

—each part of the B27 Cable Terminal has been engineered to more than meet field requirements in design and construction. Here is a protected terminal that is easy to install, easy to maintain and built to outlive the cable.

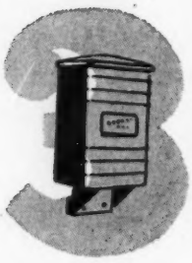




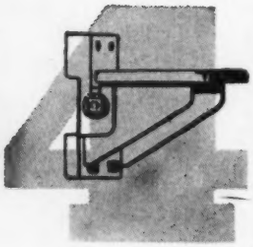
Reliable B27 Cable Terminal provides front accessibility of drop wire binding posts. Terminal studs are treated to prevent season cracking and have bevelled washers for easy separation during cold weather.



Reliable Self-cleaning Sawtooth Discharge Blocks are standard equipment. Blocks are held by individual phosphor bronze springs and cannot be accidentally loosened or crossed. Molded bakelite is used for all insulation.



Square weather-proof cover has a cast aluminum top to prevent damage from climbers. Spring catch holds cover in raised position. It cannot tilt or contact live parts.



Heavy steel mounting bracket is detachable for simplified installation. All steel parts are thoroughly hot galvanized. Cable chamber is cast aluminum and provided with full round sealing gasket.

RELIABLE ELECTRIC COMPANY

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OVER 35 YEARS SERVICE TO THE TELEPHONE INDUSTRY

Complete Text of

AMENDED WPB ORDER U-2

Issued May 3, 1945

THE Office of War Utilities of the War Production Board has issued an amended Utilities Order U-2, which provides the order of precedence to be followed in filling applications for new telephone service.

Revision of the order, it was stressed, will not, however, materially affect the status of most of the nearly 2,000,000 applications for telephone service that are currently unfilled because of lack of facilities.

OWU Director Edward Falck pointed out that both the OWU and the telephone industry "are taking all possible steps, as war conditions permit, to increase the manufacture of additional equipment, but the backlog of applications will remain for a number of months." It was indicated that telephone companies can install all the new equipment which they deem necessary as long as the materials needed are available.

Under revised U-2, new businesses are to receive telephone service ahead of all other applications except those for war and essential civilian needs with Schedule A status, and business change of address applications. Previously, only new business enterprises established by veterans had been given this status; new businesses established by veterans will continue to be given telephone service ahead of all other new business applications.

Members of the Merchant Marine and their families are included for the first time in the revised order in the definition of Schedule C applications, which are entitled to new residence telephone service ahead of unclassified new residence service applications. Schedule C previously applied only to members of the armed forces and their families. The conditions for classification of both servicemen and members of the Merchant Marine and their families in Schedule C remain unchanged.

Another change in the revised order eliminates the provision restricting the number of telephones that were permitted in any central office to 105 per cent of capacity figured by prewar standards. The effect of this change will be to permit some expansion in the number of connected telephones in many central offices throughout the country. Several other minor alterations also are made in the new version of the order, which replaces Order U-2 as amended December 19, 1944. The complete text of the newly amended U-2 follows:

PART 4501—COMMUNICATIONS

[Utilities Order U-2, as Amended May 3, 1945]

TELEPHONE SERVICE

Section 4501.1 *Utilities Order U-2* is amended to read as follows:

(a) Definitions.
(b) Availability of facilities for essential uses.
(c) Limitations on additional telephones.
(d) Limitations on replacements.
(e) Non-applicability to certain replacements and additions.
(f) Exemption of armed forces.
(g) Engineering and planning.
(h) Reports.
(i) Appeals and applications.
(j) Violations.
(k) Communications.

Schedule A.
Schedule B.
Schedule C.

§ 4501.1 *Utilities Order U-2*—(a) *Definitions.* (1) "Operator" means any individual, partnership, association, business trust, corporation, receiver, or any form of enterprise, whatsoever, whether incorporated or not, the United States, the District of Columbia, any state or territory of the United States, any political, corporate, administrative or other division or agency thereof, to the extent engaged in rendering telephone communication service within, to, or from the United States, its territories or possessions.

(2) "Schedule A service" means service to the extent required for the proper discharge of duties in the direct defense, public health, welfare and security categories listed on Schedule A attached.

(3) "Merchant Marine" has the same meaning as in Section I of Public Law numbered 87, Seventy-Eighth Congress, approved June 23, 1943.

(b) *Availability of facilities for essential uses.* (1) Operators shall disconnect service when they learn that the present real user of service is not a user contemplated in the service agreement. Any such disconnections shall be considered "normal disconnections" within the meaning of paragraph (b) (2) below.

(2) Exchange line plant, exchange central office equipment, or telephone sets made available through normal disconnection or by new acquisition shall be used to take care of applications for service in the following order:

(i) Schedule A service, public pay station service and service specifically authorized by the War Production Board because of essentiality or unreasonable hardship.

(ii) Changes of address of business service within the same exchange or to another exchange of the same operator within the same metropolitan area or within such other area as is defined by the operator's established practices.

(iii) New business service for an enterprise which the operator finds is substantially owned and principally operated or managed by a veteran who applies for service within twelve months after being honorably separated or placed on terminal leave from the armed

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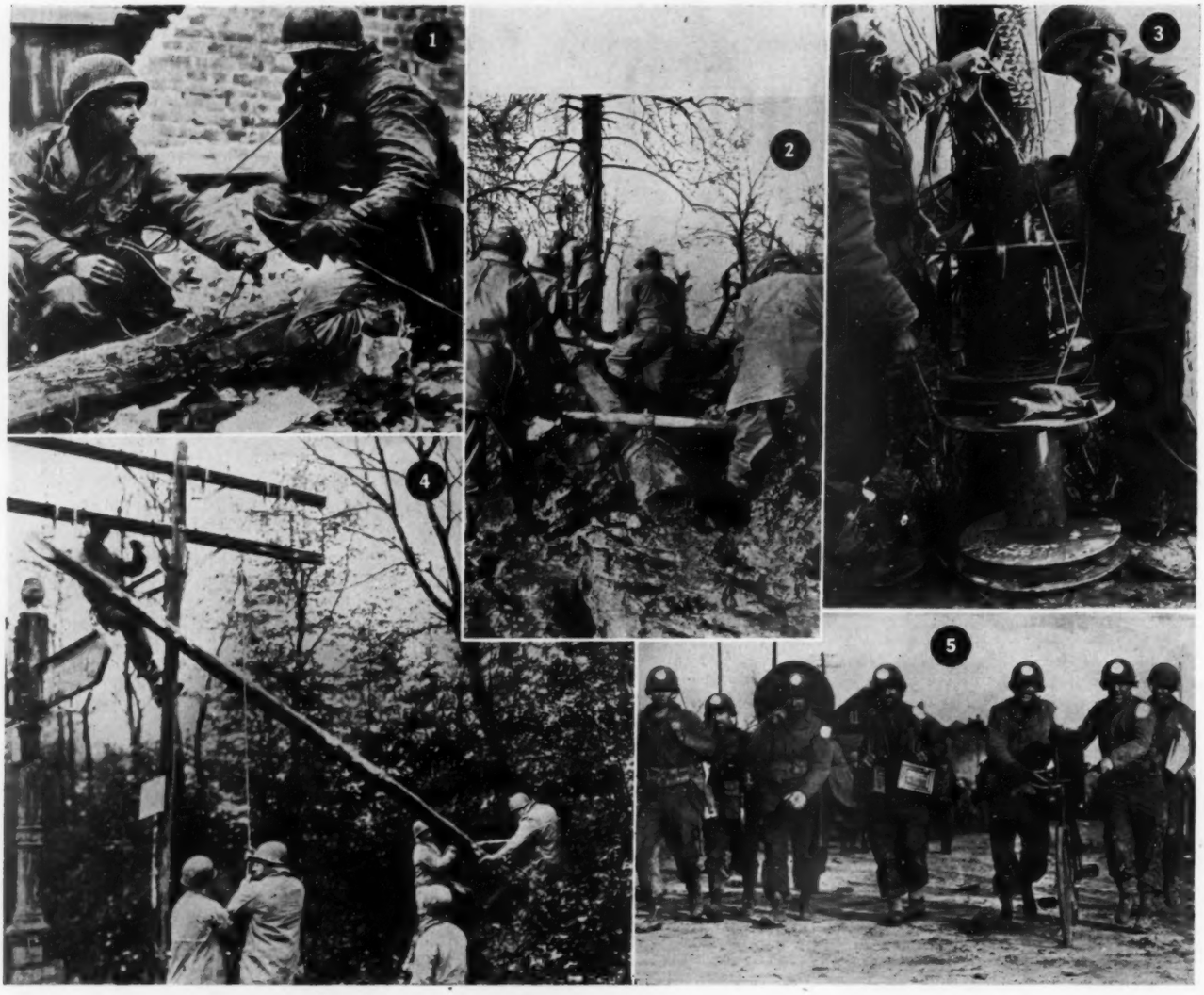
Aftermath in Germany

It is sometimes hard to realize the important part being taken by telephone service in the war, in the actual fighting zones and now with V-E in the coalition and the reorganization. (1) U. S. signal men test wires amongst the rubble in Germany. (2) Wading in deep mud in Apweiler, Germany, our men use lumber tongs to carry telephone poles to the line they are building. (3) Setting up a testing point. (4) Installing push-pull braces on a new pole line in Bastogne. (5) After a bulldozer cleared a way through the town, communications equipment here moves to Setterich.
(Signal Corps photos)



forces of the United States or the merchant marine provided such enterprise is expected to be the veterans' principal means of livelihood. The applicant for service must certify to these facts in substantially the form set forth in the Certification Form (WPBI-2545).

(iv) New business service.

(v) Changes of address of residence service within the same exchange or to another exchange of the same operator within the same metropolitan area or within such other area as is defined by the operator's established practices.

(vi) Additions to existing business service.

(vii) New residence service set forth in Schedule B.

(viii) New residence service set forth in Schedule C.

(ix) New residence service other than that included in categories (i), (vii) and (viii).

(x) Where the operator finds that immediate installation of service is essential to the protection of life, such installation may be made as an exception to the order provided in the above categories. Such service shall, however, be disconnected promptly at the termination of the emergency and the facilities used to take care of applications as otherwise specified above.

(3) Idle facilities may be reserved to the extent operators find necessary to meet promptly the known or fairly anticipated requirements for Schedule A service and to provide for essential public pay station service.

(4) To the extent necessary to meet minimum needs for Schedule A service and for essential public pay station service, operators shall make available additional exchange central office equipment or exchange line plant by regarding any service under the following provisions:

(i) Regrading is to be done only when current installations of central office equipment permit. Regrading of Schedule A service and of business service is to be done only if regraded service meets minimum service needs.

(ii) Residence service shall be regraded before business service. Any regrading shall be in the reverse order of the dates of connection at the existing locations, that it, the most recent shall be regraded first.

(Please turn to page 64)

MANAGEMENT IN THE OPERATING TELEPHONE COMPANY

By
JOHN R. PORTER
President
Carolina Telephone & Telegraph Co.
Tarboro, N. C.

THE management of operating telephone properties has been my vocation for the past forty-five years. In this period of time I have seen many varying conditions: booms, when the demand for facilities was insatiable; depressions, when the discontinuance of service was heartbreaking; and the ravaging effects of two global wars. I have also seen a great many changes and improvements in the art of telephony and in the development of much new and revolutionary apparatus. However, through these many years of changing times and changing conditions there is one thing that has experienced little or no fundamental change and that is *good management.*

Webster defines the word management as "Those collectively who manage any enterprise or interest." From this definition it can be seen that management is not considered as the effort, direction, or thought of one individual, but the combined effort, direction and thought of several individuals.

The definition given for the word manager is "One who conducts business or household affairs, with economy." It naturally follows, therefore, that management is the collective effort of a group of managers. The emphasis placed on this self-evident conclusion may seem unwarranted here, however its importance will be made clear in later paragraphs.

What success I may have attained as part of the management of operating telephone properties I attribute in very large measure to my adherence to certain fundamental rules of management which are set forth in the following paragraphs. I am confident that I have not always followed all of them in every respect, yet I am equally sure that my results have been less effective in direct proportion to the extent of my deviation from them.

Selecting the Right Man

THE measure of a good manager is his ability to select the right man for any given job. To many people this ability seems to verge on the supernatural, but in reality it is only the application of good common sense coupled with a careful study of human nature. To generalize in this is practically impossible, yet the full thought may be expressed by the old adage, "Don't try to fit a square peg in a round hole." This ability to select the right man is particularly necessary in the management of an organization which is composed of several independent operating departments and made up of widely separated operating areas, each embracing a number of individual exchanges or group of exchanges. It can be appreciated that it is a physical impossibility for the senior executive, irrespective of his individual ability, to personally answer or reach decisions on the many day-to-day problems arising in the many units of the organization. It is likewise impossible for the senior executive to directly supervise the work of the many individual workers or the scheduling and planning for the smaller operating groups. All detail management, therefore, must be delegated to junior executives and the success or failure of the organization rests with the ability of these men.

JOHN RUCKER PORTER

Never Stop Training

IN telephone work it is practically impossible to find prospective employees who have been fully trained in the numerous skills required in this business. This is true because of the very low turnover of the trained personnel in practically all telephone organizations and because of this fact it is necessary that the various skills required be taught within the establishment. Also, the art of telephony is constantly changing and for an organization to keep abreast of the times the employees must study and be ever alert to investigate new ideas and new methods.

It is the responsibility of management to provide the necessary tools for presenting an effective training program. This training program should not only be conducted for new employees but should be used to further the development of existing employees.

One of the primary tools of any training program is the instructor. The success or failure of such a training program rests in a very large measure with the ability of the instructor to imbue the student with the desire to learn and to present the material in such a clear and concise manner that it may be readily assimilated. Again the caliber of a good manager is shown in his choice of instructors, because for some inexplicable reason the most successful instructor is not necessarily the most skilled and efficient workman.

The primary objective of employee training is to produce more efficient workmen. One of the primary results of employee training is *employee satisfaction*, that is, the employee knows that the management of his organization is giving him every opportunity to further his ability and his worth to himself and to his company.

Develop Replacements

THE strength and virility of any organization is very largely dependent upon its ability to replace from within its organization, without interference or interruption, the loss of any given employee. This means that every supervising employee should train and develop some one of his men to handle the supervisory work. An organization that is wholly dependent on any one individual is in for a rough time, for it is an inescapable fact that sooner or later that individual will pass on into the beyond. When this happens, it is too late to begin thinking of training replacements; and serious repercussions may be felt throughout the establishment.

There are several reasons why supervisors fail to develop *number two men* capable of stepping into their shoes within the operating group. One of these reasons is thoughtlessness and

THE AUTHOR

John R. Porter, president of the Carolina Telephone & Telegraph Company since 1938, entered the telephone field at the turn of the century in the auditor's department of the Cumberland Telephone & Telegraph Company at Nashville. This was the beginning of eighteen years' service in managerial positions in Tennessee, Louisiana and Kentucky, followed by almost thirty years in North Carolina where he was general manager of the Home Tel. & Tel. Companies of North Carolina and Virginia, with headquarters at Henderson, N. C., until the Home Tel. & Tel. Co. and the Carolina Tel. & Tel. Co. were merged in 1926. Mr. Porter was transferred to Tarboro, N. C., as executive vice-president of the new organization and later made president.

As to his national activities Mr. Porter was president of USITA in 1943 and is now serving on several of its committees. He is a member of the Telephone Operations Industry Advisory Committee of the WPB and the National Telephone Panel of the Nation's War Labor Board.

Mr. Porter has seen the business of the companies he directed show a steady and prosperous growth, and through his tireless efforts and recognized ability he has won a place in the heart of everyone interested in the Independent telephone business.

reluctance to expend the time and effort to provide the necessary background training. An equally prevalent reason is fear that the *number two man* may displace the supervisor.

However, it has been my experience that the man chosen for promotion is the man who has developed a suitable replacement for himself.

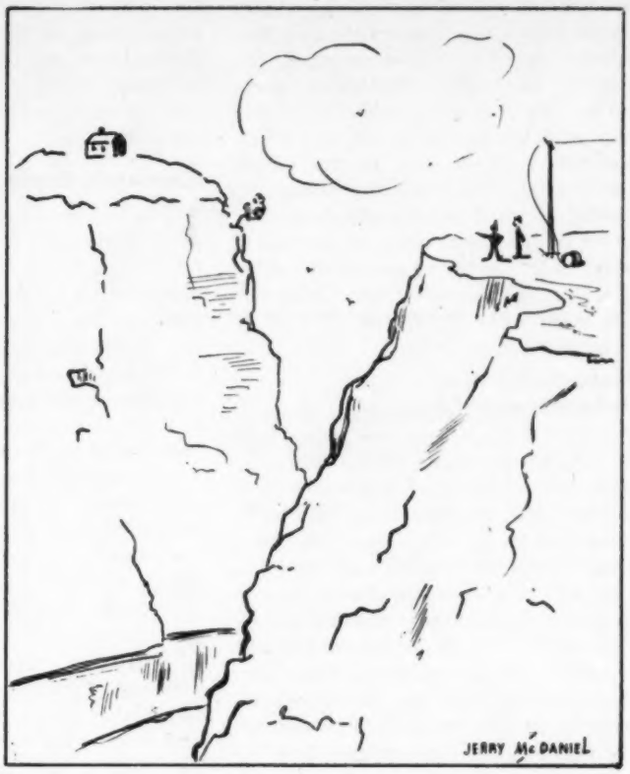
Decentralize Authority

IN order to develop supervisors or junior officials it is vital that they be made to feel the responsibility of making decisions. To do this they must be given the authority to act independently, to weigh the merits of a case and arrive at an answer. It is axiomatic that the employee, be he line foreman or department head, for whom all decisions are made, will soon find himself incapable of making decisions. This is a point ofttimes overlooked by the top management group and when this is the case, the effectiveness of the overall organization is materially reduced.

A ready method for furthering the ability of decision—making in the supervisory group is to propound a single problem to several supervisors with the request that they independently reach a decision. Then in joint conference have each supervisor present his solution to the problem and carefully weigh the merits of each and collectively arrive at the most satisfactory solution. In this way the timid or less sure supervisor will gain confidence and needed reassurance that his ideas or suggestions will be given equal consideration with those of more aggressive supervisors. As the power of analysis and the formulation of sound conclusions are increased, the responsibilities assigned to the individual employee may be safely enlarged.

Follow Your Lines Of Organization

AFTER a smoothly functioning organization has been set up with proper junior officials and supervisors selected and fitted into key positions, a good manager will only deviate from his lines of organization in cases of emergency. The morale of any supervisor or supervisory group can be quickly undermined if their decisions or instructions are reversed or materially changed by senior executives without the knowledge of the supervisor originating the decisions or instructions. This does not mean that the senior executive should shut himself off from contact with any employee other than those directly responsible to him. To the contrary, he should maintain an "open door" policy, making himself available to any employee whatever his level in the organization.



"Yeah—He wants a phone to call in his grocery orders . . ."

The immediate result of by-passing lines of organization is to create within the mind of the lower level supervisor a false sense of superiority over his immediate supervisor, since he has free access to the orders and directions of the senior executive. Further, it creates a sense of fear and indecision in the minds of the top supervisors in that they know that any of their orders may be countermanded or changed without their knowledge. The ultimate result of this practice is to completely destroy the effectiveness of the intermediate supervisors and place the full responsibility of management on the senior executive.

Protect Employee Welfare

THERE is a great deal of truth in the saying, "A satisfied worker is a good worker." This is true in any organization, be it an operating telephone company or otherwise. If your employees are convinced that each member of management, the supervisor of a two-man crew or the senior executive, is keenly alert and constantly exerting all of his energies to the welfare and advancement of his employees, you will have a satisfied employee group. A simple rule to follow to obtain this result is for each supervisor to handle his employees as he would like to be handled if their respective positions were reversed.

Practically all companies have one of several forms of benefit plan or insurance plan, covering accidents and disabilities to its employees. However, one thing that is not always readily available is the sympathetic treatment by the supervisory force of the many and varied problems arising in the day-to-day lives of the employee personnel. These problems can and no doubt will cover a wide range of subjects, from affairs of the heart to serious illness within the employee's immediate family, advice and assistance in making income tax returns, advice as to investments, advice as to obtaining loans to meet an immediate emergency and many, many others too numerous to mention.

Develop Initiative

THE development of initiative is one of the most difficult problems of management. However, it is a very essential quality and much time, thought and study should be given to its development.

The average employee works willingly and diligently at any assigned task and upon the completion of this task waits patiently for the assignment of the next job even though there is much work of similar nature needing to be done. The employee with initiative is one who, upon the completion of an assigned task, finds additional work that needs doing and keeps fully occupied through self-direction.

Initiative in many employees is a very feeble flame and may be quenched with one harsh word or one stern rebuke. Once extinguished, this flame

can only be rekindled with the greatest of patience, perseverance and understanding. On the other hand, initiative, like other admirable attributes, can be over-emphasized and may work to the detriment of the individual employee and to the entire organization. To avoid the disastrous effects of such overdevelopment the factor of judgment must be developed along with the development of initiative, for initiative without judgment can very well be likened to a "bull in a china shop."

Make Full Use of Subordinates' Ideas

I CAN think of no one thing that contributes more to the strength, vigor and alertness of a group of employees than the knowledge that their ideas and their suggestions in connection with the operation of the business will be given sympathetic consideration and that they will be recognized for having originated the thought or plan. Many valuable ideas have been lost through an unsympathetic attitude in the supervisory personnel and an even greater number lost because some supervisor unwittingly failed to give full credit to the originator of the thought or plan. I have known of cases where untold harm was done in this respect by a supervisor claiming credit for the thought or plan originated by one of his employees. When the supervisor of a group makes an effort to see that the originator of the idea gets full credit, he grows in stature in the eyes of the employees under his direction as well as in the eyes of his coordinates.

Be Quick to Praise and Slow to Criticize

I DO not believe there is a single individual who does not react very positively to both praise and criticism. Before I go further I would like to emphasize that by praise I do not mean flattery, for flattery is unfounded approval which is soon detected and is not appreciated by a sincere workman. Praise, however, is the recognition of a job well done, ofttimes not a perfect job but a job well done within the capabilities of the individual performing the task. The supervisor, by voicing his approval, will engender in his subordinate a fine feeling of understanding and friendly fellowship. Before criticising an employee's efforts the supervisor should be very careful to acquaint himself fully with the instructions issued, the tools furnished, and the capabilities of the individual assigned to perform a given piece of work. Many times a careful analysis of a poorly done job will reveal that the instructions were inadequate, improper tools were provided, or the individual was assigned a job far above his present capabilities, rather than lack of willingness or desire to do the job correctly.

Executive Responsibility

IT is the responsibility of the senior executive and his coordinates to establish company policies. These policies cover, in general, all of the functions of the entire organization, ranging from the adoption of working hours to the selection of the type of equipment to be used and the handling of finances. The top executives must *point the way*, and to maintain a happy and prosperous organization they must be ever alert to adopt new materials, new methods and new techniques. The easy way is to rock along with the attitude that "what was good enough for my father is good enough for me"; but in these days of changing requirements, ever increasing demands for improved service, higher taxes, and higher salaries and wages, the top management must be quick to adopt every expense reducing innovation available.

Excellent examples of what I have in mind are the conversion of service from the antiquated, expensively operated, manual magneto service to the modern, inexpensively operated, mechanical dial service and the provision of additional toll circuits by the installation of carrier equipment rather than the costly wire stringing method of years gone by.

Remember Management's Threefold Obligations: Public—Employees—Stockholders

THE management of an organization is responsible to the public, to the employees and to the stockholders. It is impossible to place these groups in any order of importance, for the groups are so interrelated and interdependent upon each other that they are of equal importance. If management should neglect the employee body, the organization would fail; should management neglect the public through the rendering of poor service, the organization would fail; and by like token, should management operate so extravagantly and ineffectively that a fair return is not made on the money invested, the organization would fail.

I like to think of these responsibilities of management as the legs of a tripod. Each must be kept strong and healthy or the whole will topple. As outlined in earlier paragraphs each manager, irrespective of organization level, is part of the company's management, therefore the legs of the tripod are strong in direct proportion to the abilities of the many managers within the organization and their keen awareness of this threefold responsibility.

DO YOU KNOW

Telling about "boners" that creep into motion pictures, Cecil B. DeMille recalls the time an absent-minded "prop" man put a French telephone on a table at Caesar's elbow during the making of a Cleopatra film.

✦

No wonder the United States never lost a war, a dice player points out, with the West Point Military Academy telephone number listed as West Point 7-11.

✦

A woman explained in a Boston employment agency that her last job had been perforating the pages of telephone directories so that a professional strong man could tear them in half.

✦

The telephone directory for Republic 7500, the telephone number of "National War Agencies" in Washington, D. C., lists 14,100 extension instruments.

During the first three weeks of the Italian invasion, Army Signal Corps units installed about 5,300 miles of telephone lines.

✦

Telephone—"Work of the Devil"

Ibn Saud, King of Saudi Arabia, is fond of telephones and radios. *Time* is a recent issue reports Ibn Saud has put the telephone to good use in unifying his domain but that when Ibn Saud introduced the telephone, some of the people declared it was the devil's tool. Ibn Saud replied, "Of a certainty if it is the work of the devil, the holy words of the Koran will not pass over it." Holy words passed over clever Ibn Saud's new telephone line, so there were no more objections.

✦

Forty-six per cent of all the homes in the United States have telephones.

News Briefs...

National Telephone Panel Holds Clinic In Chicago

The National Telephone Panel of the War Labor Board met in Chicago, May 7 and 8 to hold the first of a series of meetings with labor and industry repsentatives to discuss the National War Labor Board wage stabilization policy for the telephone industry. Further meetings are planned in future possibly in New York and the West Coast.

According to Pearce Davis, chairman of the Panel, "the purpose of the Chicago meetings was to afford employees and employers an opportunity to become more familiar with the details and application of the Board's wage stabilization policy for the telephone industry." The Panel at Chicago consisted of G. H. McCorkle, vice president of the Illinois Bell, and R. A. Phillips, vice president of the Central Telephone Co., Sioux Falls, S. Dak. as industry members; John J. Moran and William M. Dunn, presidents of two of the NFTW labor unions representing labor and Pearce Davis, chairman and member representing the public. Approximately 150 attended each day's session.

G. B. Foscue Buys Indiana Exchange

G. B. Foscue, 2934 Indian Wood Road, Wilmette, Ill., has purchased the Hendricks County Telephone Company of Clayton, Indiana. The company owns and operates exchanges in Clayton, Stilesville and Hazelwood, Ind. with approximately 700 stations in the group. Clayton is about 15 miles from Indianapolis. The exchange was purchased from H. C. Weaver, who operated the exchanges as owner for the past 13 years.

Mr. Foscue is president of the company and H. L. Winton is vice president and general manager. Mr. Winton until recently was owner and operator of the Ralston Tel. & Tel Co., Trout Run, Penn. He disposed of this property some time ago. Before that he was an operating telephone man in Oklahoma for 15 years.

Reopen Telegraph Circuits Between Italy & U. S.

The Federal Communications Commission has authorized the reopening of circuits for commercial telegraph service between the United States and Italy. Operations for commercial traffic were expected to begin May 4.

The rates applicable to these circuits will be substantially lower than the prewar rates; for example, they will be 20 cents per word from New York to Italy for full rate messages, 12 cents per word for code, 10 cents per word for deferred, and 6⅔ cents a word for letter messages.

These rates will apply to traffic over the radio facilities of R. C. A. Communications, Inc., and to the cable messages carried by Commercial Cable Co. and Western Union Telegraph Company.

Cut in Phone Book Publication Likely

A serious curtailment might be forced on telephone companies regarding the publishing of telephone directories within the next ten or twelve months unless raw material stocks of wood and wood pulp substantially improve, an authoritative source at the WPB recently announced.

New Limitations Bills Introduced

In addition to the bill introduced by Congressman Gwynne to amend the U. S. Code in establishing a limitation of one year for bringing wage suits, another bill has been introduced by Senator Johnson of Colorado. The bill, S. 760, would make the limitation six months. Clyde Bailey, executive vice president of USITA, in his member letter No. 86 reports that the bill is drawn as a direct amendment to the Fair Labor Standards Act and has been referred to the Senate Committee on Education and Labor.

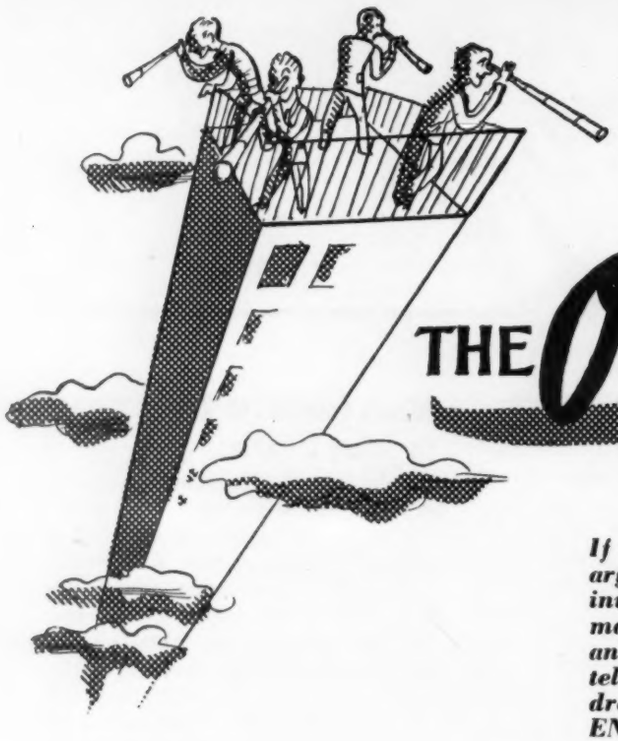
Illinois Commission Rules On Salary Increases

Following OPA's indication to the Illinois Commerce Commission that operating expenses claimed by the Mason City Telephone Co. included certain salary increases which had been permitted by the Treasury Department on the understanding that such increases should not involve raises in rates and charges, the Commission disallowed the salary increase on the ground that they were improperly included in operating expenses.

"Telephone Review" published by the New York (N. Y.) Tel. Co. was awarded first place in the second Red Cross War Fund cover contest for company magazines. Editor is R. Irwin Johannesen.

Purchase Farmers Mutual

Kelley McNish, president of the Inter-Mountain Telephone Company, Bristol, Tenn., announces their acquisition of the facilities of the Blountsville, Va., telephone system from the Sullivan County Farmers Mutual. The Inter-Mountain company has plans for rehabilitation of the new purchase and installation of dial service as soon as the materials and man-power situation permit.



Conducted by the
Observer and his Gang

THE Observation Tower

If you have observations or even a friendly bit of argument suitable for use in this column, you are invited to send them along, which automatically makes you a member of the Gang. You will be anonymous—no names of telephone people or telephone companies are used in this column. Address "The Observer," in care of TELEPHONE ENGINEER AND MANAGEMENT.

Do You Need a Fire Insurance Checkup?

GANG Member No. 76 has told us about some experiences he had recently in the matter of insurance—fire and miscellaneous insurance. Says that when he started out on an inspection trip of his twelve exchanges a month or so ago, he had the bright idea of taking an insurance expert along with him. And, he says, he found out a lot of things.

The insurance man, it seems, went around poking his nose into every nook and cranny of each exchange building, making notes in a little black book and sometimes sadly shaking his head. Then, as he completed his inspection of each building, he called on Gangster No. 76 and the local exchange manager to follow him while he pointed out things that needed to be done.

It all totted up, says this Gangster, to something like this: Two chimneys to be repaired; one to be rebuilt. An asbestos shield behind one heating plant, which was too near some woodwork. Some old fire extinguishers replaced with a new type, and several additional extinguishers installed. A couple of trash cans moved from their location to a safer one. One roof fireproofed. Several miscellaneous fire hazards corrected—such as the installation of an inexpensive back yard incinerator in place of a trash-burning open space, and so on.

"But," says Gang Member No. 76, "we found that when we had done all these things, our insurance rate came down enough to justify all the expenditures. The most important thing, however, was that we eliminated existing fire hazards, and improved our emergency fire-fighting facilities. So we made a profit all around on the deal."

Hereafter, says this Gang Member, he intends to have a very thorough check made of all his exchange buildings and warehouses at least once a year or perhaps oftener, by an experienced and critical insurance man. Then he is going to see that the expert's recommendations are carried out. He is also going to see that the company's employees at each exchange are given instructions on not only the way to avoid fires, but also the best way to fight them.

This looks to us like a very constructive undertaking. There may be a lot of telephone exchanges where it would be advisable to do the same things.

Which reminds us that we have been told by an insurance man that many businesses are, in his opinion, lax or careless about their fire insurance. Sometimes, he says, they don't carry enough insurance to really protect them. Sometimes they are careless about renewing policies. They depend on the insurance agent to think of it—and sometimes he is careless, too, or maybe out fishing.

In some parts of the country, says this insurance man, companies should carry tornado insurance in addition to fire. Also he thinks that telephone companies should carry Use & Occupancy insurance—which pays them for revenue lost while an exchange is out of operation because of a fire.

We can tell you the foregoing because we're not in the insurance business, and we won't get any commissions if you do take out more insurance. We must admit, however, that we have an uncle in the fire insurance business. However, the most we ever got out of him for pointing out a new customer, was one bottle of beer—and we have a suspicion that he probably added the cost of that to the customer's bill.

When is a Business Small?

GANG Member No. 110 is worried about the efforts of Congress and certain government officials or agencies to help small business—by relief from burdensome taxation, by some practical system of helping them finance, and by other means—but what worries him, he says, is that these folks don't seem to know what really is a small business.

"I tried to find out what these fellows really meant when they were talking about small businesses," says this Gangster. "One lead I got was some testimony given before a Congressional committee by some sort of an expert who testified that a small business was one that had fewer than 500 employees."

"Well," said Gangster No. 110 disgustedly, "if my business had anywhere near 500 employees, it would look as big to me as the United States Steel Corporation! What I think of when I visualize a small business is the little outfit with a few to maybe 40 or 50 employees."

"That's the kind of businesses we have in the small towns where my company operates. They're really small businesses—the kind of which there are some hundreds of thousands in the United States. Many of them, of course, are little local businesses—the drug or grocery store, the laundry, the local garages and service stations, and so on. But a lot of them are small manufacturing companies, frequently making things that could be sold throughout the country if they had the capital with which to expand."

"These," he says, "are the small businesses that I want to see helped in my communities. If they grow, they bring more people to my towns, and these people will want telephones."

"But," he adds, "I wonder if the government agencies that are so busy trying to do things for small businesses know what a really small business is. I doubt it, because none of the plans they have set up so far seem to be much help to the really small fry."

"I think that any business that has upwards of 500 employees can probably get along on its own. But there are a lot of really small concerns that would be greatly helped if, for instance, they could obtain long-term, reasonably cheap capital money with which to enlarge their operations."

We think this Gangster is right, and we point to the fact that a lot of the really small businesses are small telephone companies. As to when a telephone company is really small—well, as we said some months ago, we looked that up. We found that the U. S. Department of Commerce classed a telephone company as "small" when its annual revenue was less than $10,000.

Seven Mistakes of Life

GANG Member No. 37 thinks it would be a good idea if telephone people knew about what are said to be the seven principal mistakes of life. So he has sent them in, and, to be obliging, we're telling you what they are. Author unknown. Here they are:

1. The delusion that individual advancement is made by crushing others down.
2. The tendency to worry about things that cannot be changed or corrected.
3. Insisting that a thing is impossible because we ourselves cannot accomplish it.
4. Refusing to set aside trival preference, in order that important things may be accomplished.
5. Neglecting development and refinement of the mind and not acquiring the habit of reading and study.
6. Attempting to compel other persons to believe and live as we do.
7. The failure to establish the habit of saving money.

How Things Do Grow in the U. S. A.!

IF you happen to be of a philosophical turn of mind, here's something you can philosophize on when you think about the future of the U. S. A.

A little more than 20 years ago, radio broadcasting was still more or less in the experimental stage and the broadcasting stations were owned principally by manufacturers who operated the stations at their own expense in order to get people to buy receiving sets.

No advertising time was sold, and there was a great hullabaloo against the idea of cluttering up the air with advertising. But finally somebody decided that the only way broadcasting could be maintained permanently and in sufficient scope to cover the country, was by selling advertising time on the radio. So radio advertising was born, but even then some experts thought it would not work—that nobody would be foolish enough to pay real money for advertising over the radio, or, if they did, the listeners would shut off their radio in disguest when it began to spout admonitions to buy so-and-so's soap or breakfast food and so on.

But look at what happened! In 1927 the gross sales of advertising time on all the then radio broadcasting stations was less than $5 million. In 1932 (in depression), sales of time were about $62 million. In 1937, about $144 million. And in 1944, almost $400 million.

There must be some moral to all of this; maybe several of them. One of them is that even the experts can be wrong.

But it seems to us that the most important moral is the warning that, as somebody once said, you should never "sell America short."

Here is an industry that has grown up in this country, almost silently so far as the money end of it is concerned, from nothing to a big industry in hardly more than 20 years. Now, with frequency modulation and television coming on, it will probably grow to be a much bigger industry in the next decade or so.

Some unimaginative people have the habit of pointing to the telephone, the automobile, and a few other big industries of the kind, as evidence that all the big industries have already been created and have grown to near maturity. Economists ask: "Where is the big new industry that will take the place of the growth, for instance, of the automobile industry?"

Well, we don't know exactly where or what it is, but we do know that it will come along. We have that faith in the ingenuity and enterprise of our fellow Americans.

A lot of people need more imagination. They should remember the statement by the guy in Mr. Shakespeare's Hamlet who said, as we recall it: "There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy."

Regarding Hitler, Mussolini, Goebbels, et al:

THE JUDGEMENTS OF THE LORD ARE TRUE AND RIGHTEOUS ALTOGETHER."

The Observer

Telephone Engineer's

RADIO COURSE FOR TELEPHONE MEN

CHAPTER 2, SECTION 2

Inserted in this issue is the 4-page 4-color FREQUENCY SPECTRUM CHART suitable for framing, a valuable addition to the telephone man's library. This chart pictorially presents the relationship between frequency and such physical manifestations as sound, radio, television, light, X rays, etc.

By B. C. BURDEN
Technical Consultant
Lincoln, Nebraska

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The Radio Broadcasting Band

FROM 550,000 cycles to 1,500,000 cycles (550 to 1,500 kilocycles) we have the so-called *standard radio broadcasting group*. In this relatively narrow band of frequencies are confined practically all of the A.M. (amplitude modulated) broadcasting stations in the United States. These stations are assigned frequencies differing approximately 10 kilocycles from each other. If all of the standard broadcasting stations now licensed were allowed to operate at the same time and were they of equal power, it would be necessary to limit the number of stations to about 100 to accommodate them in this narrow band. However, by assigning channels so that stations having the same frequencies are widely separated geographically and by also limiting the time during which the stations operate, it is possible to accommodate a great many more than 100 stations in the range from 550 to 1,500 kilocycles.

At broadcast frequencies the antennas used for transmitting purposes must be relatively long. For example, a one fourth wave length antenna would have a physical length of over 375 feet for the most efficient operation on 600 kilocycles (500 meters). In the standard broadcast band, no particular difficulty is experienced with such components as tubes, coils, and condensers so far as their physical dimensions constituting a problem in the design of transmitting and receiving apparatus is concerned, as the dimensions are relatively short as compared to the wave length involved Fig. 12 illustrates the relative lengths of a 600 kilocycle and a 600 megacycle antenna.

Skip Distance Effect Short Wave Radio Band

AS we move upward from the highest frequency in the radio broadcasting band (1,500,000 cycles) to a frequency of 60,000,000 cycles (from 200 to 5 meters) we encounter what has in the past often been termed the

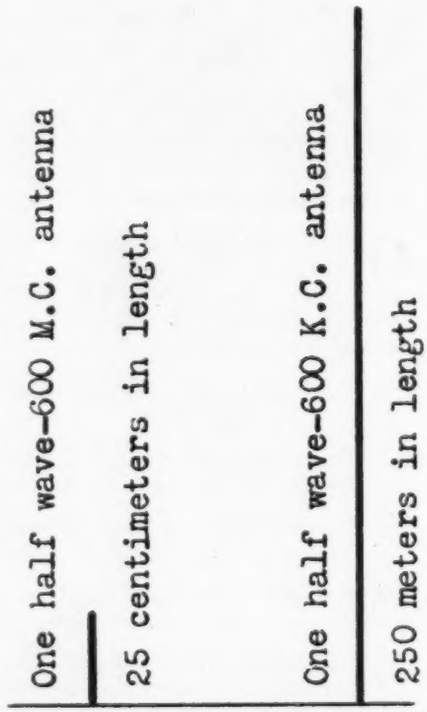

Fig. 12—Comparison of relative lengths of a one half wave 600 kilocycle antenna and a 600 megacycle antenna.

short wave radio group. In this band and directly above the broadcasting group are a number of frequencies assigned to police stations throughout the country. Also, a narrow band of frequencies has in the past been allocated to amateurs in this region. As we proceed still higher in frequency through the short wave band, we find assignments allocated to the army and navy, to the international broadcasting stations and to frequency modulation and television experimental stations. Above 3,000 kilcycles (100 meters) we find that our radio waves no longer function as they did at the lower frequencies. (Fig. 13)

A new phenomena enters the picture known as the *skip distance effect.* This refers to the effect of short waves being reflected by an ionized strata known as the *Heaviside Layer* which is thought to exist at a distance of approximately 100 miles above the earth. This ionized layer acts in much the same manner as would a metallic conducting surface and results in the short wave signals being reflected back to the earth many miles away from the transmitting point. This action is shown in Fig. 14.

As a result of this skip distance effect the short waves, especially those

Special Problems at the Higher Frequencies

IN the band between 1,500-60,000 kilocycles (200 and 5 meters) antennas become shorter and shorter and greater care must be exercised in the design of transmitters and receivers if they are at work as efficiently as was the case at the longer wave lengths and higher frequencies. A half wave antenna designed to work on 60,000 kilocycles (5 meters) need be only about 8 feet as compared to 328 feet for the same type of antenna designed for 1,500 kilocycles (200 meters). Such factors as the capacitance of the tube elements, length of wiring leads, dielectric losses, and other similar items become so important that they must be given special consideration. This results in the necessity for special types of vacuum tubes in which the interelectrode capacitance is substantially reduced. The wiring leads which connect the tubes to the radio frequency portion of the circuit must be made very short. At the extremely high frequencies it is sometimes necessary to mount apparatus directly on the tube connections in order to keep the wiring leads very short.

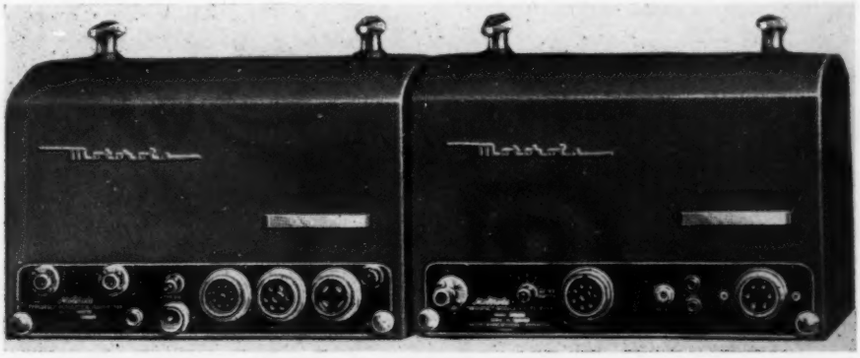

Fig. 13—Radio and television, radar, air and sea navigational aids utilize frequencies in the range of 10 kilocycles to 30,000 megacycles. (Illustration shows high frequency mobile FM type radio transmitter and receiver. Courtesy Galvin Mfg. Corp.)

below 80 meters, are very useful for long distance communication. Their effectiveness varies both with the time of day and the season of the year. This again is thought to be due to the daily and seasonal raising and lowering of the ionized layers of the upper atmosphere.

This skip distance effect, especially on the waves below 80 meters, permits communication over surprisingly long distances with relatively low power at the transmitter station. The *ground wave* from the short wave station follows the curvature of the earth and is quickly absorbed by buildings, trees, etc., hence it is only the *sky wave* that is useful in long distance communication at these higher frequencies.

Quasi-Optical Frequencies

AT frequencies above 200,000,000 (200 megacycles) radio waves begin to act in many respects like light waves, hence are sometimes referred to as *quasi-optical waves.* It is a well-known fact that light rays do not bend around corners or over hill tops and that if we interpose opaque objects in the path of these rays we can intercept and block them. The extremely high frequencies (above 200 megacycles) seem to respond to laws similar to those which apply to optics and it is necessary at the higher frequencies to mount the transmitter so that it is in the *line of sight or near line or sight,* of the receiver.

Plan of Study
for students of "Telephone Engineer's RADIO COURSE for Teelephone Men"

This special radio course has been prepared for the training of telephone men in the applications of radio principles to the wire communication field.

To make the course more complete and more effective, the author will present at the conclusion of each chapter a series of test questions. These questions are to be answered by students and mailed to the author for correction and grading. (Students need not take advantage of the test questions, grading, etc. unless they so desire.)

The first lesson appeared in the April 1, FORTNIGHTLY TELEPHONE ENGINEER; the second installment was in the April 15 TELEPHONE ENGINEER & MANAGEMENT. The second chapter started in the May 1, FORTNIGHTLY, and the second part of Chapter 2 begins on the opposite page. The complete course will be continued in succeeding issues of FORTNIGHTLY TELEPHONE ENGINEER on the 1st of each month and TELEPHONE ENGINEER & MANAGEMENT on the 15th of each month.

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Reprints of the first two lessons are available for late subscribers.

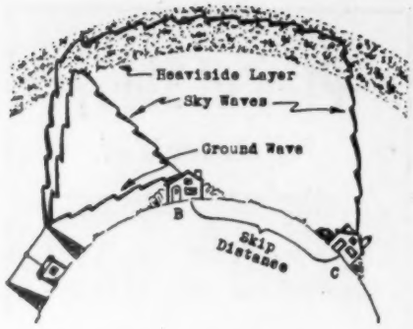


Fig. 14—Skip distance effect on higher frequencies (below 100 megacycles).

Reflectors of practical size can be used at the higher frequencies and these result in greatly improved transmission efficiency. At the extremely short wave lengths (frequencies above 1,000 megacycles) the physical dimensions of a suitable reflector become comparable with those of the reflectors used on large searchlights.

There is no sharp line of demarcation above which the radio frequencies begin to follow much the same laws as light waves. In general, at frequencies above 300 megacycles the waves bend very little and *line of sight* or at least *near line of sight transmission paths* are generally required. At frequencies above 100 megacycles there is little or no *sky wave transmission* but the ground wave does bend somewhat and tends to follow the curvature of the earth. The amount of this bending becomes less as the frequency is increased.

Reflected Waves

AT the higher frequencies we also encounter *reflection phenomena.* This is an action whereby high frequency energy radiated from a transmitter may be reflected by conducting objects such as wires, metal buildings, hills, etc. so that the direction of transmission is changed. This action is comparable with that which takes place when a light wave is reflected by a mirror.

In many cases both a *direct wave* and one or more *reflected waves* may arrive at an ultra-high frequency receiver as is shown in Fig. 15. Due to the difference in the length of the path over which the several waves travel they may arrive "out of phase." This is particularly objectionable in connection with television reception as the reflected waves distort the received picture.

Reflection effects may in some cases prove helpful in connection with communication systems as they permit signals to reach a receiver over an indirect or reflection path when transmission over the direct path might not be possible because of some intervening steel building or elevated terrain.

When radio channels are used to supplement wire circuits, *reflectors,* either in the form of parabolic metal units or *antenna arrays,* will undoubtedly be used by telephone companies to *beam* signals from one office to another, between radio relay points and from office to rural subscriber.

In the range above 1,000 megacycles we find frequencies which have enormous possibilities but which as yet have not been fully developed. At the present time, it would appear that in the telephone field this band of frequencies would prove most useful for long haul radio relay systems.

Experiments were conducted several years ago in which a successful two-way conversation was carried on across the English Channel using a wave length of 18 centimeters (approximately 7 inches) and at very low power. In these experiments large metal reflectors were used to beam the very short waves used.

Much development work will be required before these extremely high frequencies can be put to full use. Their particular usefulness lies in the fact that the waves are so short that they can readily be directed with relatively simple reflector systems and because these high frequencies operate on a virtually true line of sight basis hence the same frequencies can be used over and over throughout the country.

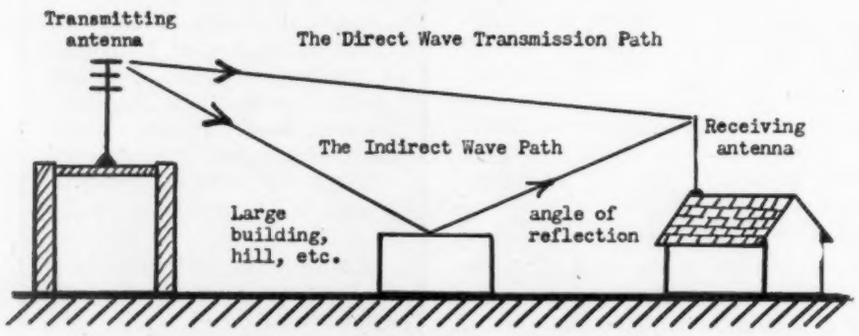


Fig. 15—Illustration of the action of direct and reflected waves.

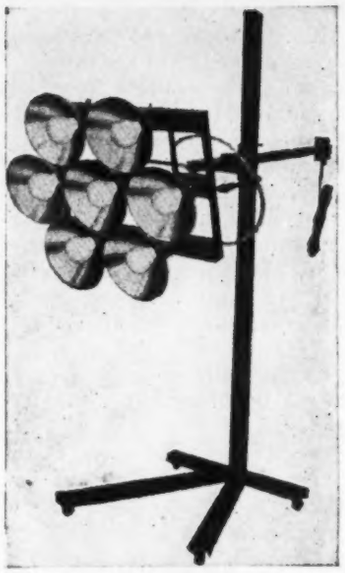


Fig. 16—Special radiation type drying lamps employ infrared frequencies near 10^{14} cycles (100,000,000,000,000 cycles)

It is contemplated that by means of carefully focused narrow beams it may be eventually feasible to use the same frequencies in the same area without interference.

The Bell System has under way a project between New York and Boston which will involve the installation on an experimental basis of radio relay toll channels using a number of ultra and super-high frequencies.

The Federal Communication Commission in its preliminary report on frequency allocations (Sept. 1944) proposed to make available to telephone companies a number of frequencies in the ultra and super-high frequency ranges which could be used experimentally to determine their suitability for several types of telephone service including rural and short haul toll.

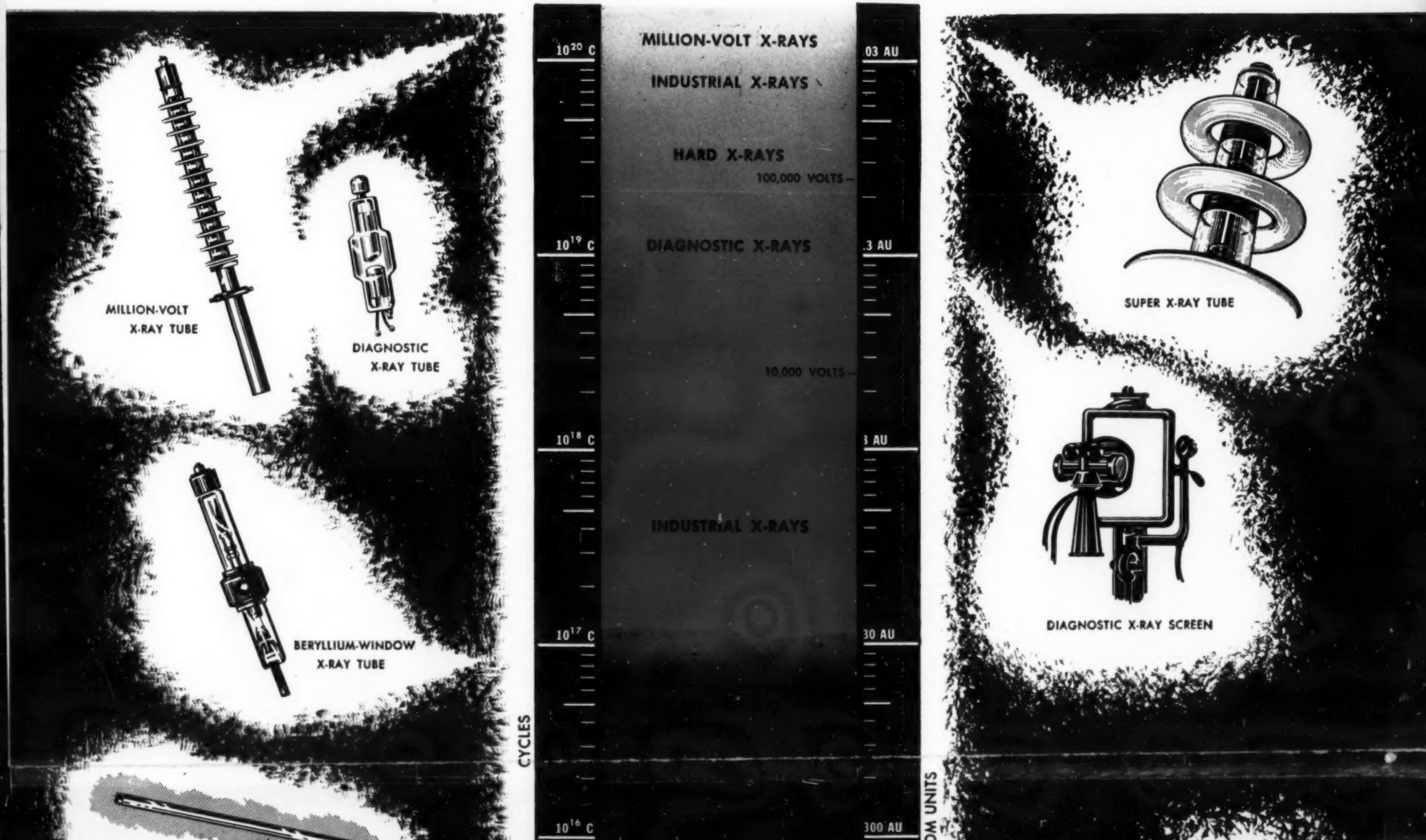
It is doubtful if the true line of sight frequencies could be utilized for rural telephone service because of the difficulty that would be experienced in getting line of sight transmission paths without antennas of excessive height. However, these very high frequencies should prove useful for toll service where high antenna heights are practicable or where automatic relay stations can be used to offset the lack of a line of sight path between two exchanges.

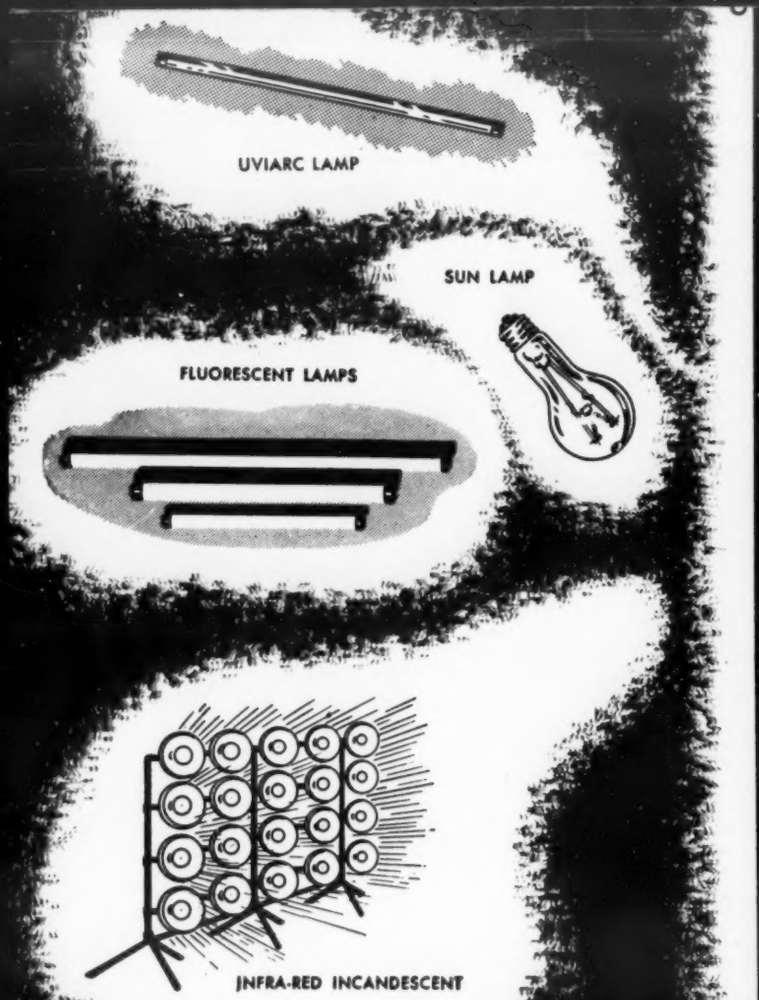
The Infra-Red Frequencies

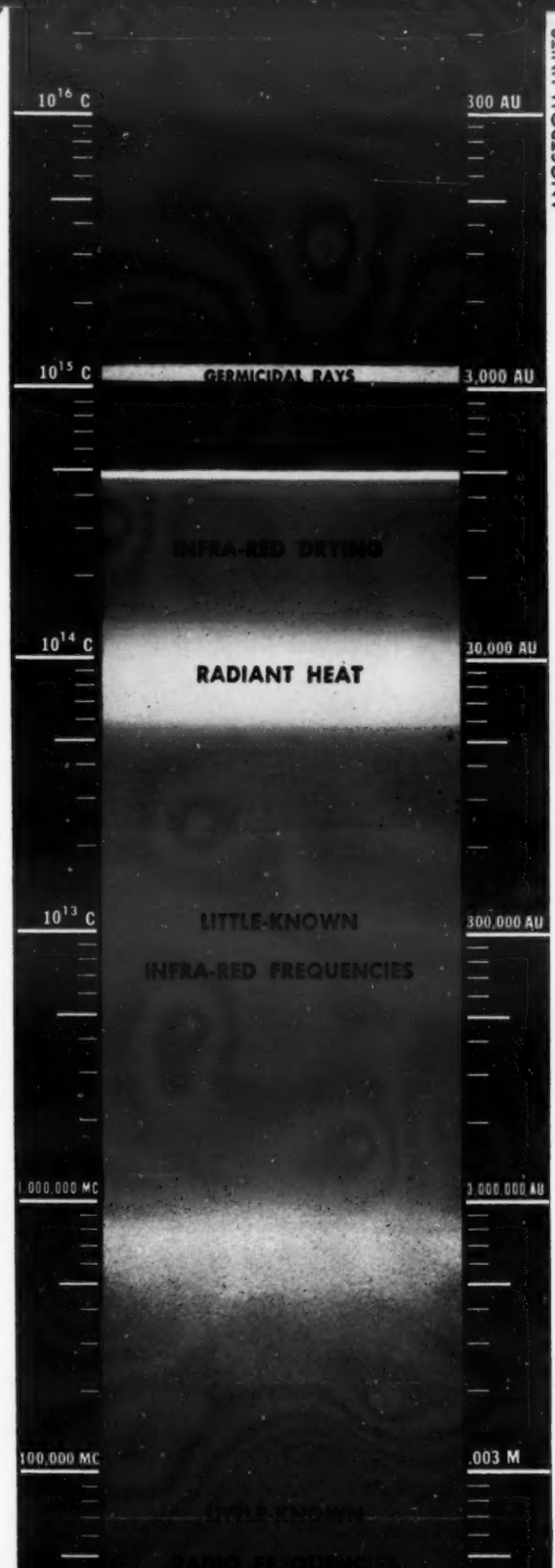
GETTING back to our high frequency generator, as we continue above 750 billion cycles (0.04 centimeter) we leave the radio frequencies and get into a new range known as the *infra-red group.* The radiations reaching us from the sun are partly in this range

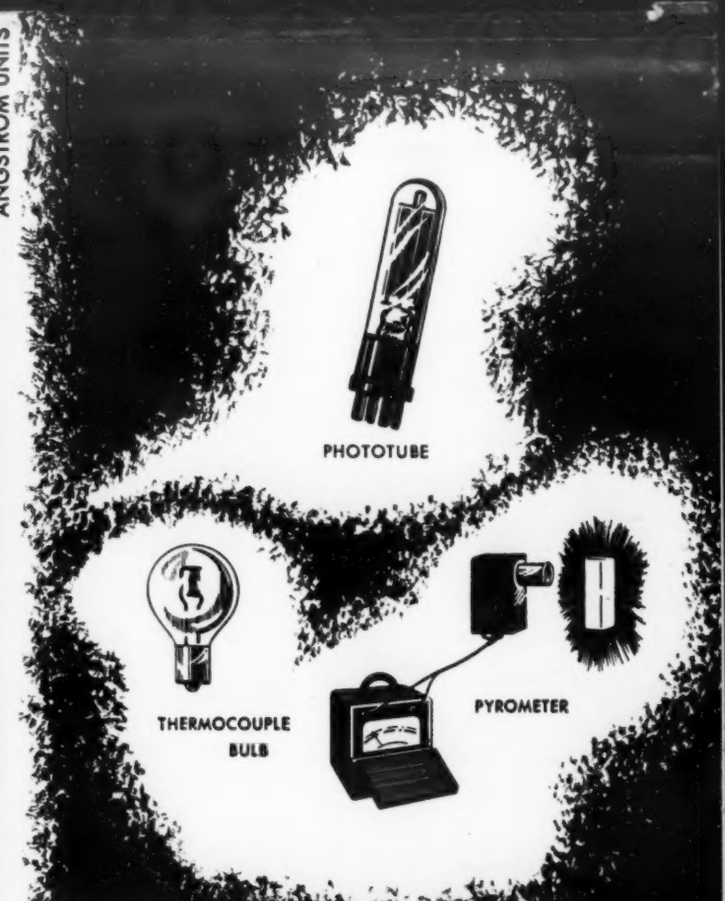
Editorial Supplement to TELEPHONE ENGINEER & MANAGEMENT, May 1945

FREQUENCY SPECTRUM
of the ELECTRONIC INDUSTRIES
Showing representative electronic tubes and devices that operate at the various frequencies









BASIC FORMULAS

Wavelength and Frequency Relationship:

Speed = Frequency × wavelength

300,000,000 meters per second (approx.) = cycles per second × meters

Electrical Resonance:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

L = Inductance in henries
C = Capacitance in farads
f = Frequency in cycles

Radiation and Temperature Relationship

E = energy radiated from surface at absolute temperature T (°K) to surrounding surface at temperature T_o

$= \epsilon . 5.67 \times 10^{-12} (T^4 - T_o^4)$ watts cm^{-2} deg^{-4}

ϵ = radiation emissivity of surface

REFERENCE CONSTANTS

Speed of Electromagnetic Radiations:
299,776 Kilometers per second = approximately 186,000 miles per second

Velocity of Sound in Air at 32°F. and 1 Atm.:
331.1 to 331.8 meters per second
1086.3 to 1088.4 feet per second
740.6 to 742.1 miles per hour

Charge of Electron:
4.8025×10^{-10} electrostatic units

Electronic Mass:
9.1066×10^{-28}g

Mass of Hydrogen Atom (^1H) (light Hydrogen):
1.6734×10^{-24}g

Planck's Constant:
6.624×10^{-27}erg × sec.

Wavelength of Red Line of Cadmium:

Radiation and Temperature Relationship

E = energy radiated from surface at absolute temperature T (°K) to surrounding surface at temperature T_o

$= \epsilon . 5.67 \times 10^{-12} (T^4 - T_o^4)$ watts cm^{-2} deg^{-4}

ϵ = radiation emissivity of surface

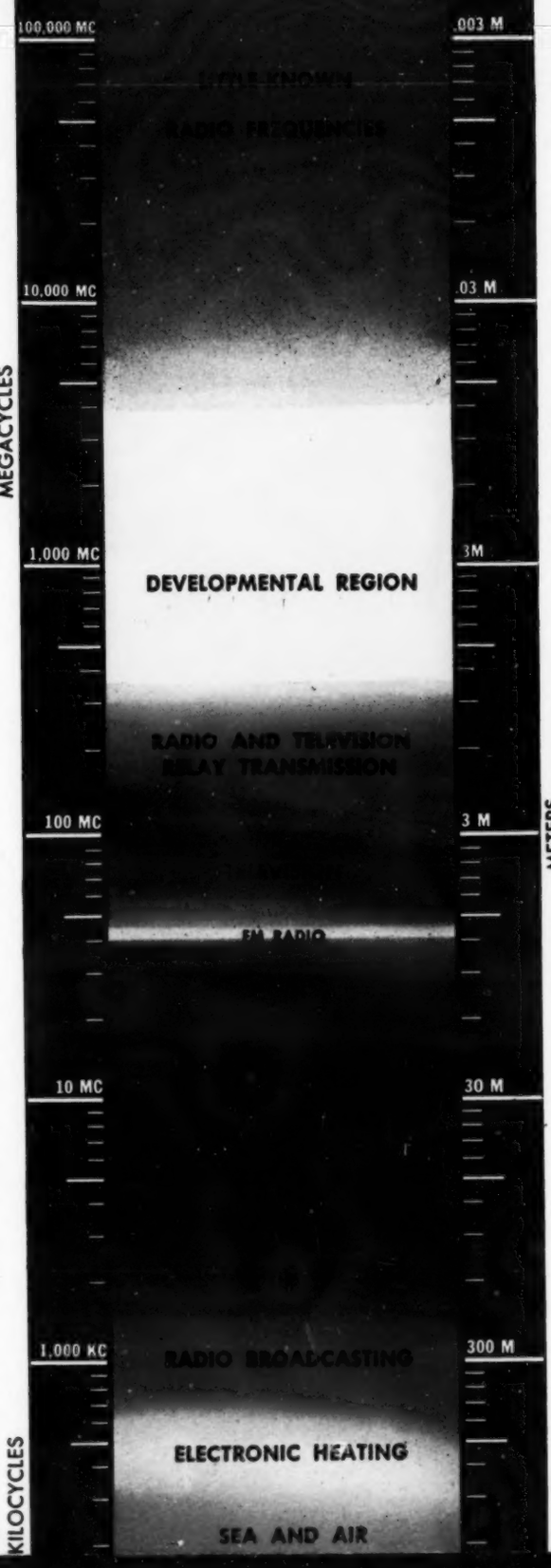
Wavelength of an Electron (Fundamental of the Electron Microscope):

$\lambda = \frac{12.2}{\sqrt{V}}$ λ = Wavelength in Angstrom units; V = Voltage accelerating the electron

Wein's Law (wavelength-temperature relationship)

$\lambda_m T = 2897$ = wavelength in microns corresponding to the maximum of the energy curve of radiation

T = absolute temperature



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Planck's Constant:
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Wavelength of Red Line of Cadmium:
6438.4696 Angstroms

Absolute Zero:
$-459.7°$ Fahr. $= -273.16°$ Cent.

Units of Length:
1 mm = 10^7 Angstrom = 10^3 Micron
1 cm = 10^8 Amgstrom
1 Micron = 1/10,000 of a cm
1 Angstrom = 1/100,000,000 of a cm

Units of Frequency:
1 Kilocycle = 1,000 cycles
1 Megacycle = 1,000,000 cycles

Units of Power:
1 kilowatt = 1.341 horsepower
1 kilowatt = 3413 Btu per hour
1 kilowatt = 860 kg-calorie per hour

Radiation and Temperature Relationship

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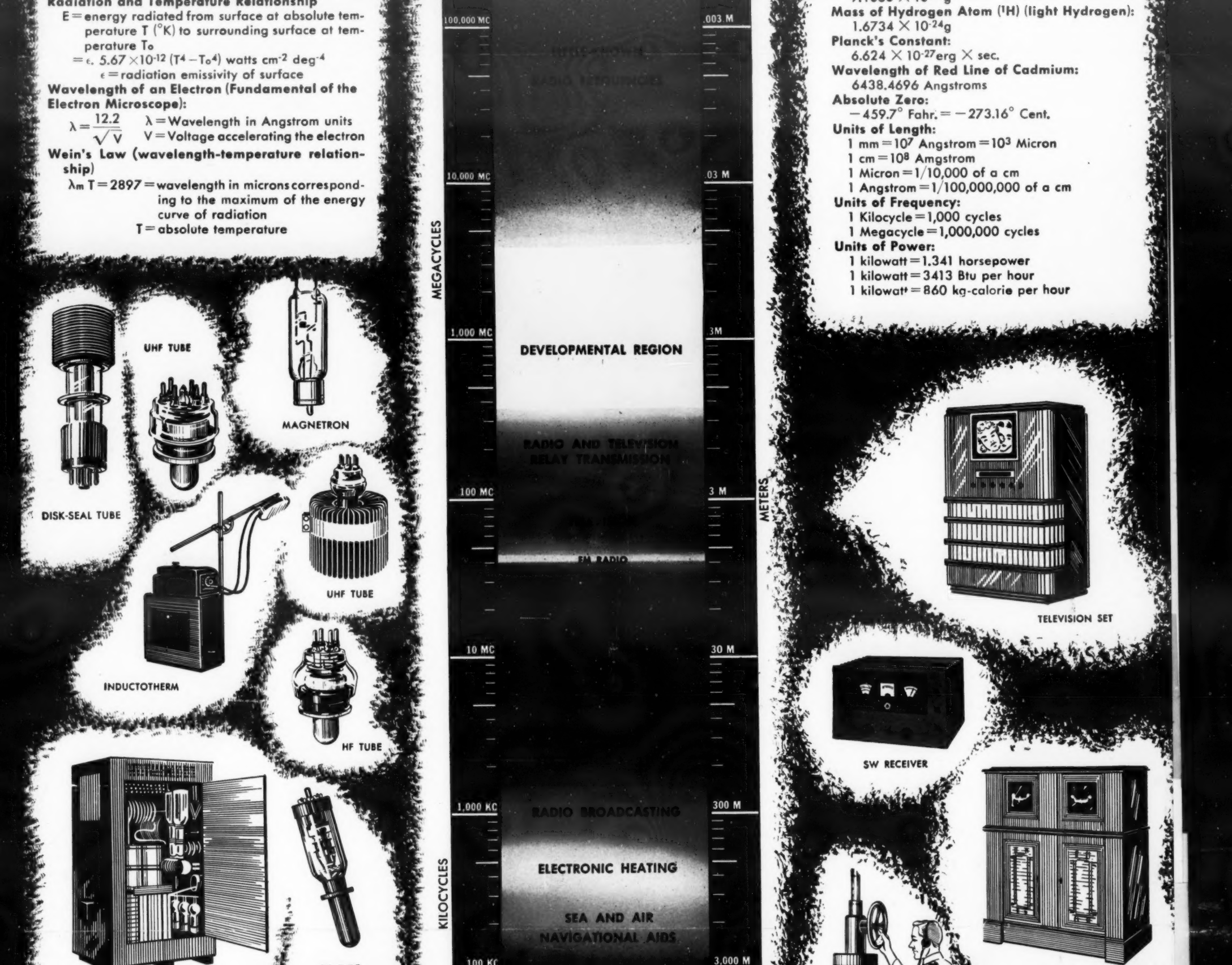
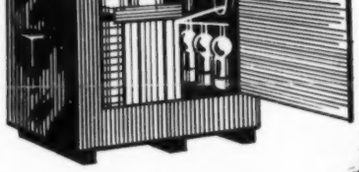
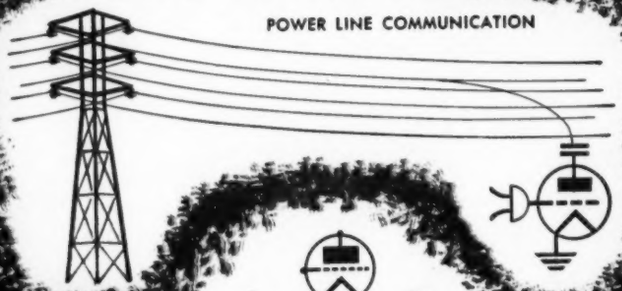


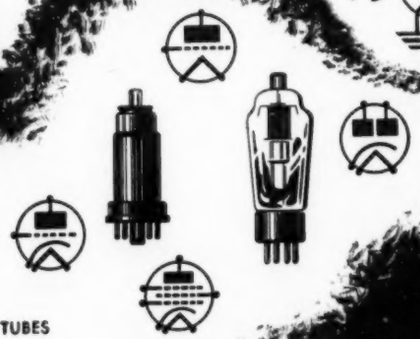


POWER OSCILLATOR

BC TUBE

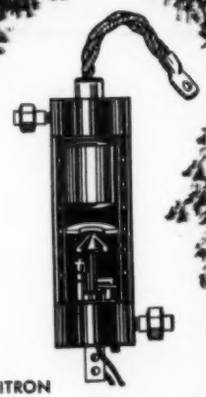
POWER LINE COMMUNICATION





TUBES

THYRATRON



IGNITRON

KILOCYCLES

100 KC

10 KC

1,000 C

100 C

10 C

CYCLES

FREQUENCY

SEA AND AIR NAVIGATIONAL AIDS

AUDIO FREQUENCIES

POWER TRANSMISSION AND DISTRIBUTION

SUBSONIC

3,000 M

30,000 M

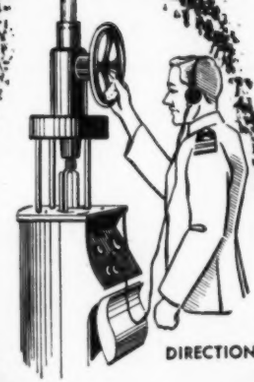
300,000 M

3,000,000 M

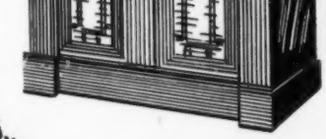
3×10^7 M

METERS

WAVELENGTH



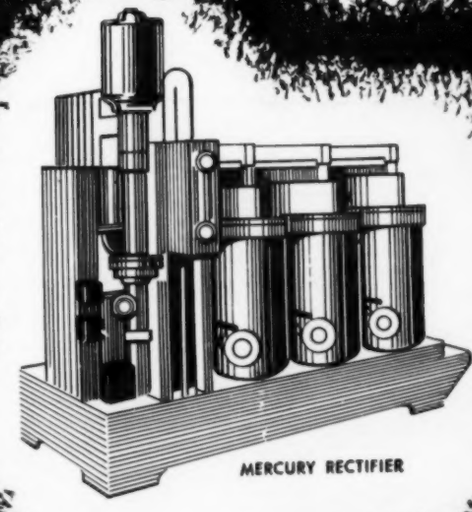
DIRECTION FINDER



HOME RADIO

SOUND-LEVEL METER

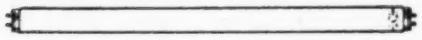
P.A. SYSTEM



MERCURY RECTIFIER

and partly in the visible light and ultraviolet range The infrared band of frequencies extend from one billion cycles to three hundred and seventy-five trillion cycles. Above 750 billion cycles these rays effect the human senses as heat and are not visible to the human eye.

The infrared frequencies in the range between one billion and 10^{13} cycles (10,000,000,000,000 cycles) are regarded as the "little-known infrared frequencies. "It may some day be found that these frequencies can be generated and used for communication purposes.



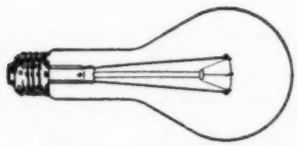


Fig. 17—Ordinary electric lamps operating at 60 cycles emit visible light whose frequency is near $10^{14.5}$ cycles.

At the high frequency end of the infrared band these rays have many of the characteristics of visible light in that they affect photo cells; however, they cannot be seen by the naked eye.

Special infrared lamps are available which have a very high output in the range directly above the visible light frequencies. These lamps are extensively used by industry for the rapid drying of painted articles. (Fig. 16).

Although infrared radiation is normally not considered as a communication transmission medium, it is possible to communicate over infrared rays. Experiments have been successfully conducted using modulated infrared frequency beams as the transmission media and photo electric cells as the receiving element. Both voice and telegraph have been transmitted for distances of several miles by this means. Infrared radiation will penetrate fog fairly well although not as successfully as the ultra and superhigh frequencies.

Visible Light Frequencies

AS we continue above the infrared frequency band, we encounter what might properly be termed the *visible light group* of frequencies. In this group are all of the principal colors, viz., red, yellow, blue, green, orange, and violet. As will be observed from the frequency spectrum chart, this is a very narrow band of frequencies. Red light is found on the infrared end of the band and violet light near the ultraviolet end of the band. The

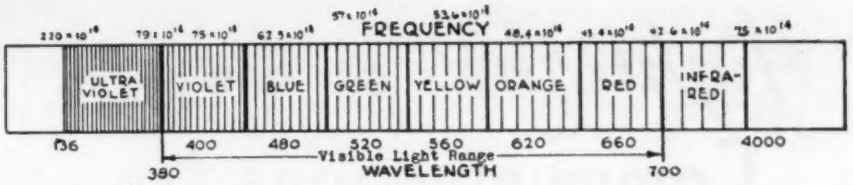


Fig. 17-1—Enlarged section of spectrum chart showing color composition of visible light.

ordinary electric lamp operating on 60 cycles emits visible light whose frequency is near $10^{14.5}$ cycles per second. (Fig. 17).

Even visible light has been used as a voice and telegraph communication medium. Using a powerful light source voice communication has been accomplished over distances as great as 30 miles using the light beam as the transmission medium and a photo cell as the receiving element.

The basic elements of a *voice light beam* communication are: A light source capable of being modulated, a light valve or modulator, a photo-cell receiver and amplifier, a system of reflectors to focus the modulated light into a narrow beam and to intercept and focus the received light rays into a sensitive photo cell which converts the light variations back into electrical currents.

Fig. 18 illustrates schematically the general features of a light beam system.

This system of communication may ultimately find some field of use in telephone systems but up to the present time no practical application has been devised.

Portable signalling systems using visible and invisible (infrared) rays are being used by the military forces. Fig. 17-1 shows an enlarged section of the visible light portion of the frequency spectrum.

The Ultra Violet Frequencies

ABOVE the visible light frequencies we encounter the ultraviolet group of frequencies. This group of frequencies extends from 750 billion cycles to 32 quadrillion cycles. On the end of the band nearest the visible light region the ultraviolet frequencies have some of the characteristics of visible light as for example their effect on photographic film and on photo electric cells. It is the ultraviolet rays which give us the familiar sun tan or *erethema* as doctors prefer to call it when they treat a patient having a case of sunburn. Ultraviolet rays can be generated artificially by means of mercury vapor lamps or by the ordinary carbon arc. The three methods are shown in Fig. 19. Ultra violet light, like infrared light, is sometimes referred to as *black light*, inasmuch as it partakes of some of the characteristics of light and yet cannot be seen. Ultraviolet rays do not at present appear to be useful for communication purposes.

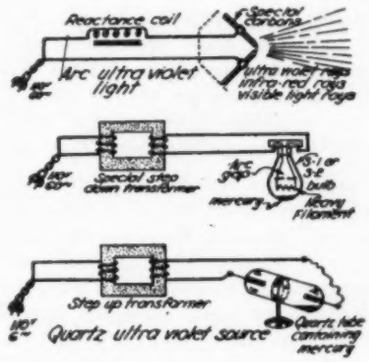


Fig. 19—Ultraviolet lamps operating on 60 cycles emit rays which produce sun tan and whose frequency is near 10^{15} cycles. (Three methods of generating ultraviolet radiation are shown.)

The X Ray Frequencies

INCREASING the frequency of our imaginary generator still higher, we come to the *X ray group*. Because of their extremely short wave length X rays have the ability to penetrate dense and opaque objects. Hence, these rays have come into wide use for both medical and certain industrial purposes. The method of photographing internal organs and bones of human beings by means of X rays is too well known to require much comment. Due to the fact that X rays will affect

(Please turn to page 60)

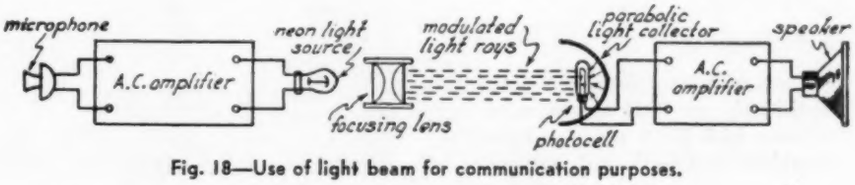


Fig. 18—Use of light beam for communication purposes.

Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

Rate Reduction

AS a result of negotiations of ten days' duration between the FCC and the American Telephone & Telegraph Co. and the Bell System companies, a $21,000,000 a year reduction in rates for long distance telephone calls anywhere in the United States beyond a distance of 790 miles has been established to become effective July 1, it was announced May 8.

Individual reductions range from 10 to 37 percent varying with distance and type of service. To illustrate the new rates, a coast-to-coast daytime station-to-station call will be cut from $4 to $2.50 for the initial three-minute period. The first hint of such a pattern of lower rates from coast to coast was given in the address of FCC Commissioner Paul A. Walker last January at San Antonio when he declared that he had the "dream" of $2.50 transcontinental rate. In announcing the rate reduction, the FCC noted that the charge for the same type of call, when the Commission was created in 1934, had been for several years $10.25. With improved technology developed by the A. T. & T. and the increased volume of traffic, the FCC cited that it had been successful in obtaining subsequent reductions as follows: 1936, $8.50; 1937, $7.25; and 1940, $4.

At the same time, the FCC also announced that it had authorized the A. T. & T. to increase its stabilization reserve fund from $400,000 to $500,000 a month.

The schedule of present and proposed rates, as jointly announced by the FCC and A. T. & T., is shown in the accompanying box.

V-E Day

The telephone industry acted expeditiously on V-E reconversion permission *with WPB sanction* before the complete conquest and surrender of Germany was proclaimed. In fact, our industry was far ahead of the now-famous Reims surrender story of Associated Press correspondent Kennedy —its reconversion "blueprint" in the termination of manufacturing limitation orders and the revision of the telephone service restrictive order U-2 came a week ahead of the formal V-E Day.

As a result of the careful planning by Director Leighton H. Peebles of the WPB Communications Division with the cooperation of Director Edward Falck of the Office of War Utilities and by the Telephone Operations Industry Advisory Committee, the stage had been set well in advance by the War Production Board for the telephone industry's wartime controls to be eliminated or revised. It was fitting in the opinion of observers who have been following the course of the telephone industry during the war that the industry should lead the way for all industries.

Of all the public service industries—electric and gas utilities and railroads particularly—the telephone industry with full accord between the companies' management (Bell System and Independents) and the WPB officials had received the imposition of most severe controls over its operations, service and manufacturing production in the early stages of the war. At the same time, the telephone industry has rendered and is offering the fullest service possible to the nation's armed forces.

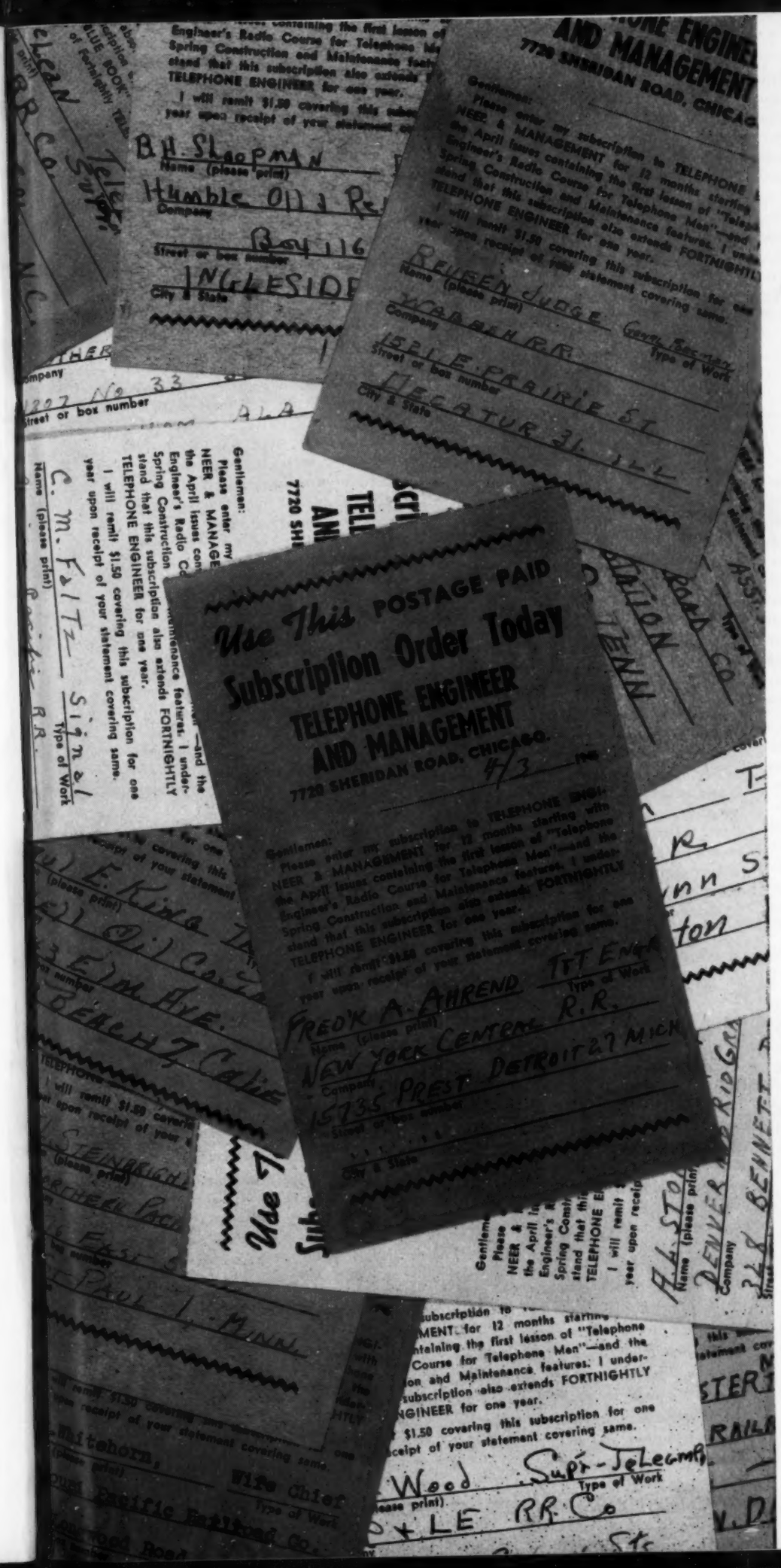
And the contribution to the war effort by the telephone industry—a tremendously vital part of the machine which led to the prostration of the Nazis—is recognized by all—most highly lauded by the Army and Navy. It is continuing to give every needed service to the military forces for the successful culmination of the Japanese war.

There are huge tasks that lie ahead of the industry, both operating and manufacturing, in the Period One (the interim between Victory in Europe and complete Victory, Japan). The major facet of those tasks is the building up of facilities—central office and instruments—to furnish service to the some 2,700,000 applicants for telephone subscriber service. Until that "normalcy" of telephone service is reestablished, the restrictions of the U-2 Order will have to remain in effect.

Another relaxation was the launching of a plan by the Board of War Communications and the Office of Censorship to effectuate permission for private overseas radiotelephone calls to Continental Europe and other sections of the world not directly affected by the Japanese one-front war.

The rehabilitation of the war-ravaged telephone system in Europe will be an-

Rate Mileage	Station-to-Station Day Initial Period	Day Overtime	Night & Sun. Initial Period	Night & Sun. Overtime	Person-to-Person Day Initial Period	Night & Sun. Initial Period
1000						
Pres.	$2.00	.55	$1.55	.40	$2.95	$2.30
Prop.	2.00	.50	1.50	.35	2.70	2.20
1400						
Pres.	2.50	.70	2.00	.50	3.85	2.95
Prop.	2.25	.55	1.75	.45	3.00	2.50
1800						
Pres.	3.50	.85	2.50	.65	4.50	3.50
Prop.	2.40	.60	1.90	.45	3.30	2.80
Over 2300						
Pres.	4.00	1.00	3.00	.75	5.00	4.00
Prop.	2.50	.60	2.00	.50	3.50	3.00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★

TELEPHONE ENGINEER and MANAGEMENT

has for many years enjoyed the

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of any ***paid subscription*** trade journal among managers, engineers and maintenance men of the telephone industry.

TODAY . . . the popularity of TELEPHONE ENGINEER and MANAGEMENT is not mostly confined to telephone men. During the past six months 353 men of communications departments of Railroads, Oil, Pipeline, and Refining Companies have ordered TELEPHONE ENGINEER & MANAGEMENT to be sent to them regularly.

These men specify or buy considerable telephone equipment and supplies.

Watch June TELEPHONE ENGINEER and MANAGEMENT for particulars regarding other groups who are finding this trade journal of such interest that they are anxious to receive every issue.

other huge task. In the main, the equipment is expected to be furnished by the telephone manufacturing plants in the liberated countries and neutral nations —the huge plants of Siemens-Halske in Germany are known to have been razed in the terrific bombardments of the Allied air forces. The plants in the liberated nations of the International Telephone and Telegraph Corporation (Paris, Antwerp, Hoboken, Belgium and Bucharest) and of Automatic Electric (Antwerp where the Belgian underground performed a notable job of sabotaging the Nazi war effort) came through intact in the German retreat. At present they have been engaged 100% in furnishing equipment for the Allied armies but can be turned at a moment's notice to civilian production.

Early in May U-2 received some important revisions that will be helpful in serving the public. The 105% engineering capacity of central offices for the number of main telephone stations and PBX trunks was deleted. The provisions relating to "interim service" and the original installation of dial PBX equipment—in the latter case to provide for dial PBX boards and subscriber sets wherever available to be installed for new service applicants—were also eliminated.

The categories of preference for the installation of telephone service by operating companies have been retained, but a "New Business Service" category was established with ranking ahead of "Changes of address of residence service" and Merchant Marine members have been the same status as those of the U. S. Armed Forces. The age limit for children in Schedule B. and C. has been raised from 10 to 15 years.

WPB Orders

THE major change in the MRO order U-3 which was under study by the WPB Communications Division as TELEPHONE ENGINEER went to press was the elimination of the $25,000 limitation on operating construction. It is thought that this could be done through making this $25,000 ceiling in order L-41 an exception in the case of utilities and telephone companies. The revocation of order U-5 means that a manufacturer may deliver on unrated orders for communications equipment, but unless the change in U-3 is effected, a telephone company must still apply on Form 2774 for authority to begin construction of any job exceeding the $25,000 limit. Form 2774 should also be filed in any case where the operator wants to obtain preference ratings not available under U-3. The termination of the $25,000 limitation will probably be the major change in telephone WPB orders for some time it was indicated.

The revocation of U-5 means that it will be no longer necessary for a manufacturer, distributor or dealer of wire communications equipment to require a preference rating for the sale or delivery of wire communications equipment. This revocation was made in order to give telephone companies a "green light" in construction projects and improvements in the case of new facilities **if materials are available.**

As a result of the revocation of U-8 manufactureres may produce any quantity of telephone instruments they can with the materials and manpower made available through the ordinary CMP-4B, WPB-3820 and related procedures.

The WPB has also revoked the directives issued to telephone manufacturers during July and August, 1944, which set up a distribution plan for telephones and under which beginning July 1, 1944, telephone companies could purchase telephones only to fill held orders and then only in an amount per quarter not exceeding 1 percent of the number of company-owned stations in service as of December 31, 1943 or in case of companies having summer peaks as of June 30, 1943. Telephone companies are now not limited in the number of telephones that may be purchased. But it is expected that both telephone companies and their suppliers will cooperate in avoiding an inequitable distribution of the telephones that are manufactured.

Fourth Wartime Poppy Day
May 28th

"Buddy Poppies" made by disabled war veterans will be sold to aid veterans, servicemen and servicemen's families.

Wear Yours Proudly!

Independent Telephone Wage Decisions May Be Guide For Industry

A POSSIBLE pattern for the Independent telephone industry in the wage increase awards by the National War Labor Board and its National Telephone Panel will in all probability be revealed in the near future in the decisions on the two pending cases—those of the Lexington, Ky., Telephone Co., (a Class A company) and the Sussex, N. J., Telephone Co, one of the very small Independents with between 650 and 750 stations. In its recommendations to the Board on these two decisions, it is a possibility that for the first time the Panel will break away from its record of unanimous findings because the Independent industry viewpoint of increased operating costs affecting financial stability of small companies may have to be stressed to the Board.

In view of the trend toward higher minimum wages, the wage problem is all-important for the Independent telephone industry. The Bell System wage situation is now being evolved by the Panel in a national pattern, but, because the cities in which Bell Companies operate present living cost situations that necessitate wage boosts during this war period, the Independent industry situation, by and large, is vastly different.

The Independent industry, especially the smaller companies with their lower margins of operating income, should exert, in the opinion of many observers, the utmost efforts in negotiating wage increases with their employees and should avoid dispute cases which have to come to the NWLB for settlement. This will mean not only the relieving of the load on the National Telephone Panel, but also can eventuate into a measurement in the negotiations of the Independent company's wage scales with the pay levels of comparable jobs for operators, commercial and plant employees in their respective smaller companies.

In the case of the larger Independents, operating in cities comparable with those where Bell companies operate, the Independent wage scales must be weighed in comparison with those of the Bell companies in adjacent territories. But it is felt that all Independent companies must preserve the historical ratio of their wages with the level in the Bell System.

The National Telephone Panel itself is trying to weigh the wages of the Independent industry in every spirit of fairness and reasonableness

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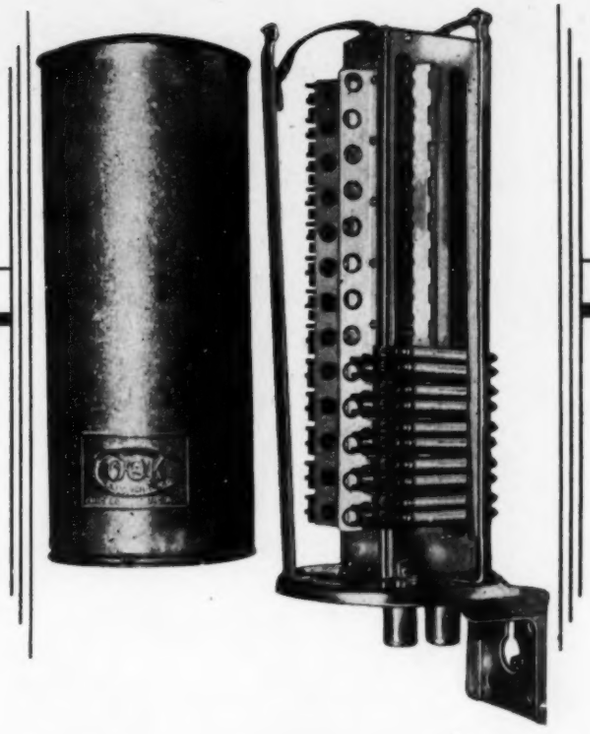
UA-20



Aerial to Underground
CABLE TERMINAL
by COOK

The UA-20 closely resembles the design of the famous Cook S-20 Pole Cable Terminal. The UA-20 is equipped with two entering nozzles and the cable chamber is equipped with terminating studs for each cable. Protection is provided by the Dual Gap H-20 Protector Unit which connects each aerial cable pair with its adjacent underground pair.

The UA-20 offers many advantages. By simply removing the fuses the overhead and underground cables are quickly disconnected, permitting testing in either direction. Special test clips with fuse clip adapters and cords are furnished. Service is re-established by reinserting the fuses into the heavy spring clips, which insures constant electrical contact and no resistance loss, an important feature in toll cable transmission.

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✓ **PRIVATE AUTOMATIC BRANCH EXCHANGES**—Provide your business subscribers with fast dial connections on local calls, and improved service on city and long-distance calls.

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We're thinking of your men — and ours. And of Strowger Automatic Telephone Equipment, which is recognized as "best" by the hundreds of Independent telephone men who know it through years of use. They'll tell you how well their specific needs have been met by such features as these:

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Ruggedly built equipment, which operates smoothly for many years—permits unattended operation of small and medium-sized exchanges.

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With all these features, Strowger Automatic Telephone Equipment also provides the kind of service that brings new subscribers, and earns rates which mean continued progress and prosperity.

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When you're planning to install aerial cable, use of GENERAL cable is perfect strategy. In the wide line of GENERAL cables, you'll find just the cable you need for any specific job. And whichever type you choose, you may be certain that every GENERAL cable fully meets the recognized high standards of the telephone industry. Into these cables is built every characteristic which makes for the greatest ease of handling, the finest of transmission quality, and the permanence which assures a practically trouble-free plant.

GENERAL Cable can be supplied, now, only for absolutely essential requirements. But when you *must* buy cable, be sure you get the protection of GENERAL CABLE quality. Standard types and sizes shown in Automatic Electric Catalog No. 6000—made also in the new, copper-saving 26-gauge sizes (information on request).

GENERAL CABLE
GENERAL CABLE
GENERAL CABLE

GENERAL CABLE
TELEPHONE WIRES AND CABLES

DISTRIBUTED BY

AUTOMATIC ELECTRIC
SALES CORPORATION

4033 WEST VAN BUREN STREET • CHICAGO 7, ILLINOIS

Dr. O. M. Vaughan Dead

With sorrow we report the death of Dr. O. M. Vaughan, founder of the Tri-County Telephone Company of South Haven, Michigan, April 23 in Fort Lauderdale, Florida.

Dr. O. M. Vaughan

Born in Covert, Michigan, Dr. Vaughan in his early years prepared himself to follow a rather deep-seated family tradition to study medicine. He graduated from the Northwestern University Department of Medicine and at the completion of his internship began his work as a physician, serving Covert and nearby localities. His exceptional mental and physical stamina served him unfailingly in his work as a physician. It also brought to play strong natural drives toward new achievements. He had for years been interested in the progress of the Van Buren County Telephone Company, of which his father had been president for several years.

In 1927 Dr. Vaughan left the medical profession and his practice to become president and general manager of Tri-County Tel. and served his community well in these capacities until 1940 when he accepted the chairmanship of the board of directors.

Dr. Vaughan contributed much to the field of Independent telephony. He was the organizer of the Michigan State Independent Telephone Association believing that an organization of this kind would assist greatly in lifting Independent telephony to a higher standard of service. He also served as a director of the United States Independent Telephone Association.

Dr. Vaughan had been failing in health for the last two years.

HUBBARD

HUBBARD PRODUCTS INCLUDE

ANCHORS and RODS
BOLTS CLAMPS
BRACKETS BRACES
GUY GUARDS and STRAPS
GUY WIRE PROTECTORS
NUTS and WASHERS
SEATS SHIMS STEPS
SCREWS FIXTURES

—and hundreds of other hardware items for pole line construction

Comments like that—which you hear from telephone men everywhere—are common for Hubbard Pole Line Hardware.

Over a long span of years the men who service the vital telephone lines of our country have come to look upon Hubbard Hardware as a friend. They know that once a job's completed with Hubbard they won't be back to make repairs and replacements. They know that Hubbard Pole Line Hardware will last for years . . . for the "duration," or for many durations if you want to put it that way.

Right now, these qualities in Hubbard hardware are paying dividends. Telephone men with Hubbard-equipped plants are sitting pretty, confident of the service built into these quality products.

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AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET, CHICAGO 7, ILLINOIS

EDITED BY J. S. REED JR.

Line AND Desk

Q. To what extent may a tree be trimmed to obtain side, top or under clearance for a telephone line?

A. The extent to which an ordinary shade tree may be trimmed is shown in Figure 1. Not all forest types, that is, trees growing close together in a row or in a group, can be pruned to the extent shown in the illustration.

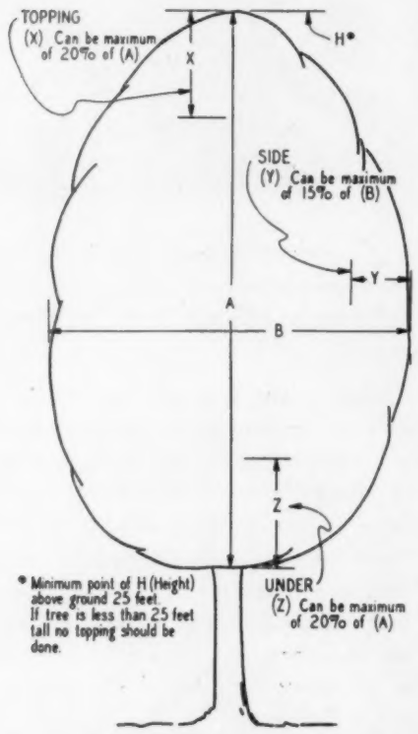

TOPPING
(X) Can be maximum of 20% of (A)
X
H*
SIDE
(Y) Can be maximum of 15% of (B)
Y
A
B
Z
UNDER
(Z) Can be maximum of 20% of (A)
* Minimum point of H (Height) above ground 25 feet. If tree is less than 25 feet tall no topping should be done.

Fig. 1—Showing extent to which a shade tree may be trimmed to obtain side, top or under clearance. (Courtesy Edison Electric Institute)

Q. What size of guy wire or strand should be used for open wire lines?

A. Guys for bracket leads need not be heavier than .203 galvanized steel or B. B. wire. For a ten-wire lead, it is satisfactory to use 2200-lb. strand when the lead/height ratio is 1.0 or more. Heavier wire leads require the use of 6000-lb. strand; and if the lead/height ratio must be more than 0.5, two 6000-lb. guys are necessary. (Note: Lead/height ratio is obtained by dividing the horizontal distance of the pole to the guy anchor by the vertical distance of the center of the wire load to the ground. This ratio should be from 1 to 1.25 to produce the least possible strain on the guy.)

Q. In a recent issue of the Telephone Engineer Handbook Tables, the minimum distance that a pole should be set from the street curb was specified as 12 inches from the street side of the curb, yet the National Safety Code permits a minimum of 6 inches clearance. Please explain this discrepancy.

A. Although the National Electrical Safety Code does specify a minimum of 6 inches clearance between the street side of the curb and a pole, it has been found that poles set as close as this distance from the street side of the curb are often scraped by bumpers of automobiles parked at an angle to the curb and automobile fenders have also been damaged in this manner. Since the street side of the curb is interpreted to mean the inside part of the curb, it is evident that the six-inch minimum provides insufficient clearance in situations where angle parking is employed. Twelve inches clearance should therefore be provided between poles and the street side of the curb to prevent damage to poles and automobiles.

Q. On account of guying materials being difficult to purchase on the market, we wonder if there is any satisfactory way of using salvaged iron line wire for guying poles. We ordinarily use No. 6 steel wire or 2200 pound steel strand for guys.

A. One of our readers recently told us about a kink that is solving his guying problems during this period of line material shortage. His method is to twist three or four lengths of good used No. 109 galvanized iron wire into a cable that can be used for light guying. The ends of each wire are fastened to a pole or other solid objects and the other ends are chucked in a carpenter's brace. By turning the brace and at the same time pulling on the wires, a very nice job of twisted strand is obtained, so this reader states. This idea seems well worth trying.

Q. What are the advantages of an outdoor type of station protector as compared to the indoor type?

A. It is our opinion that the outdoor protector makes a more satisfactory installation than the indoor type when (1) an outside ground must be placed, (2) the subscriber's residence or place of business has no basement, (3) fire hazards or other dangerous conditions are present in the building and (4) the interior location of the protector would be damp or extremely dusty. The outdoor protector is easily accessible for cleaning or replacing of protector blocks which are rather often the source of ringing or transmission trouble. Figure 2 illustrates a typical outdoor protector installation.

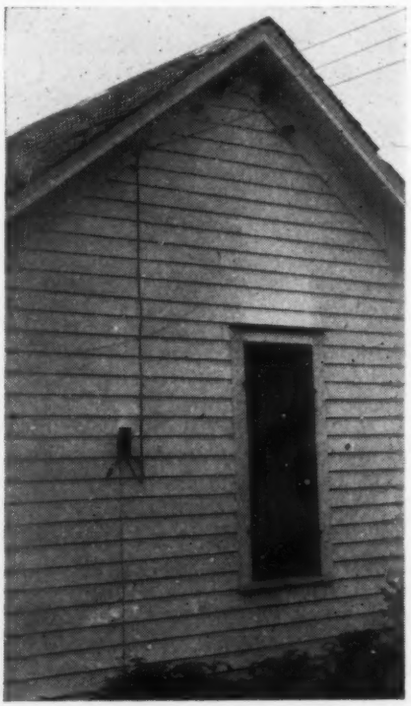
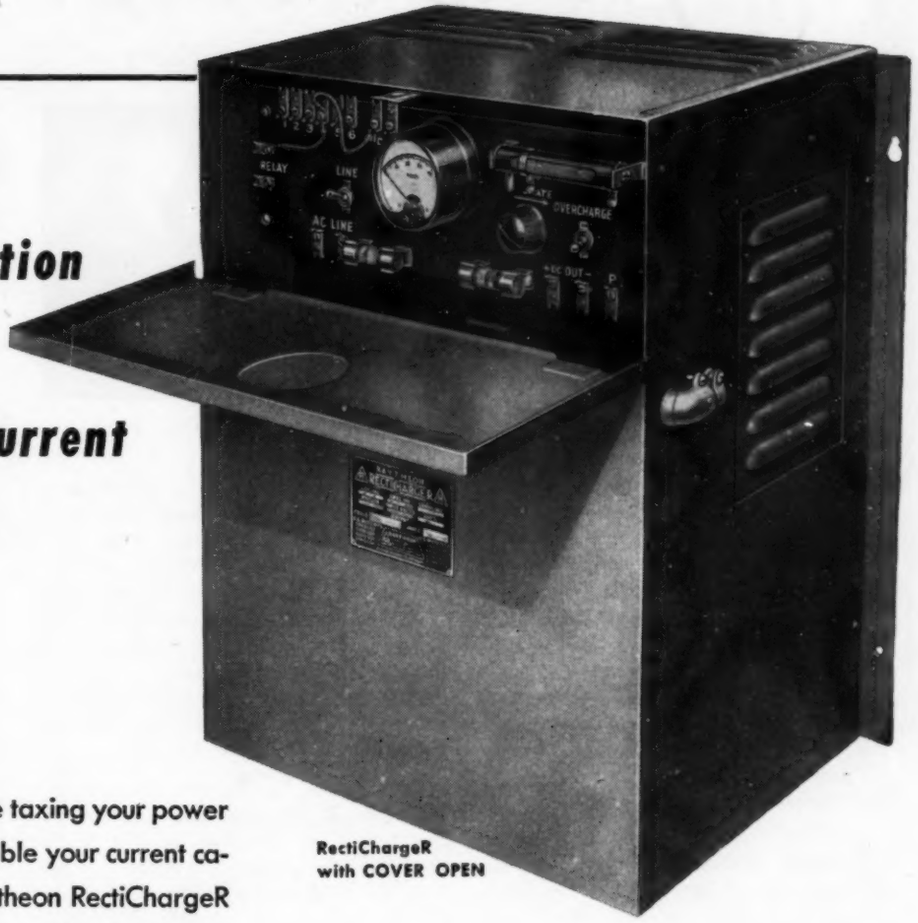


Figure 2—Typical installation of an outdoor protector.

RAYTHEON RectiChargeRs

Make the Right Combination for use with Constant Current Chargers



RectiChargeR
with COVER OPEN

If present day conditions are taxing your power facilities, you can easily double your current capacity by connecting a Raytheon RectiChargeR to any constant current charger of equal rating through a special relay.

The advantages of this combination are — stabilized D.C. voltage at any load . . . no under- or over-charging of batteries . . . fully charged batteries . . . an automatic AC-DC power system that meets all telephone power supply requirements.

Here's how the combination works — The RectiChargeR carries the entire load up to its rated capacity. Then the relay pulls in and transfers the load to the constant current charger. After that, the RectiChargeR supplies any additional current requirements up to the total output of the combination. Write for full details.

Tune in the Raytheon radio program: "MEET YOUR NAVY", every Saturday night on the Blue Network. Consult your local newspaper for time and station.

RAYTHEON
MANUFACTURING COMPANY
Electrical Equipment Division
190 WILLOW STREET, WALTHAM, MASS.

The coveted Army-Navy "E", for Excellence in the manufacture of war equipment and tubes, flies over all four Raytheon Plants where over 16,000 men and women are producing for VICTORY.

Devoted to research and manufacture of complete electronic equipment; receiving, transmitting and hearing aid tubes; transformers; and voltage stabilizers.

Personalities

R. K. Chase, secretary and treasurer of Associated Tel. Co., Santa Monica, Calif., has taken an extended leave of absence under doctor's orders.

●

L. W. Nath is the new telephone manager of the Reinbeck (Iowa) exchange of the Central Iowa Telephone Company, Cedar Rapids, Iowa.

●

D. T. Strickland, vice president and general manager of the Southwestern States Telephone Co., Brownwood, Texas, was host to seventeen district supervisors of that company recently who met at headquarters to discuss and study the retirement plans and sickness disability benefits which became effective January 1, 1945. The company operates in five states and operates 192 exchanges.

●

Harry Askew, manager of the Letcher (S. D.) Farmers Telephone Company for the past 30 years, died recently of gunshot wounds self-inflicted. He had been in ill health recently.

●

Thomas Vollum, manager of the Garden City Telephone Co., Erskine, Minn., and the company were fined $500 in federal court in Minneapolis during March on a contempt of court charge. They were charged with failing to obey a federal injunction issued April 11, 1942.

●

Walter V. Hughes, president of the Everstick Anchor Co., Fairfield, Iowa, died at his home in Fairfield recently, following a heart attack. He had been president of the company which has manufactured several items for the telephone industry since 1932. He was also president of the parent company, The Iowa Malleable Iron Co.

●

Congratulations to **Corporal Francis M. Keller,** who recently received the Soldier's Medal for helping a trapped man to safety from a burning overturned truck. Prior to his entry in the service, Francis Keller was a groundman for Lincoln (Nebr.) Tel. & Tel. Company.

Lt. Frank Henry and Col. Wm. C. Henry

Frank Henry is being congratulated by his father, **Col. William C Henry,** who arrived from France on a two weeks' assignment in Washington in time to see his son receive his pilot wings at Napier Field, Alabama. Col. Henry's activities in the telephone field include a directorship and vice presidency in USITA and general managership of Northern Ohio Telephone Company of Bellevue, Ohio.

●

Lt. R. E. Woodworth, director of the telephone division of the Navy Department, instructed Navy operators in Washington, effective April 23, to replace the traditional "thank you" of operators upon the 60,000 call-a-day switchboard with "aye, aye, sir."

●

William J. Stout, assistant treasurer of A.T.&T., has retired after 42 years with the company.

●

Don W. Walker, executive secretary of the New York State Telephone Association, reports that the directors of their association will be elected by mail and that a nominating committee has now been appointed.

●

Major Richard E. Parker, traffic superintendent and engineer for the New Jersey Bell Telephone Co. at Newark, N. J., prior to his entry into the Army, is commanding officer of a signal service detachment of the Chinese Combat Command and recently received his promotion from captaincy.

Frank J. Kivlan, advertising manager of General Cable Corporation, is to be congratulated on his company's expression of the hopes of all people on the outcome of the San Francisco Conference. This message with General Cable's signature appeared in newspapers from California to Maine at the opening of the international deliberations.

●

Dr. Harvey Fletcher, director of physical research of the Bell Telephone Laboratories and one of the nation's foremost authorities on speech and hearing, was elected president of the American Physical Society for the 1945 term.

●

Alfred Sutro, 75, who had been with the Pacific Telephone & Telegraph Company for more than 50 years, died recently at his home in San Francisco after an illness of two years. Mr. Sutro had served as general counsel and a leading member of the board of directors of Pacific Tel. & Tel. Co. for over a quarter-century.

●

Leon F. Roberts, commercial mananager of the Jamestown (N.Y.) Telephone Co. and Chairman of the USITA Committee on Advertising, has been named city chairman of the 7th War Loan Drive for Jamestown. Mr. Roberts was formerly mayor and is active in all civic affairs.

●

Van J. Pease, of the Associated Telephone Company, Santa Monica, California, has retired after a 21-year unbroken record of service. At a recent farewell party the employees presented him with a fund for shrubs and orange trees, a hobby of his, and Mr. Pease has promised to hang a sign, "Free oranges to all telephone employees."

●

Robert H. Boggs, 66, a former vice president of the New York Telephone Company, who retired in 1938 after 39 years with the company, died recently in a Greenwich Conn. hospital.

Graybar Booklet Available

A new 28-page 2-color booklet "Tomorrow's Electrical Distribution-Via Graybar" describes how Graybar through its 75 years of experience, applies the latest in wholesaling and merchandising methods. It also shows how Graybar's national network of warehouses and offices have fulfilled demands made during the stress of war and how this same organization will play a vital part in helping to solve problems of lower-cost distribution in the postwar world.

You may obtain one of these booklets by writing on your company letterhead to the Graybar Electric Company, Inc., 420 Lexington Avenue, New York 17, New York.

3 New Telephone Magazines Make Initial Bow

Copies of three new company telephone magazines have been received marking Vol. 1, No. 1 of TELE NEWS of the Indiana Associated Telephone Corp.; TELE TOPICS of the Michigan Associated Telephone Co., and TELE TIDINGS of the Lexington (Ky.) Telephone Company. The house organs go to those companies comprising the East Central Group of the General Telephone System and are published in Lafayette, Indiana, with James Richardson as editor.

Mr. E. M. Blakeslee, president of the three companies, informs us these magazines will be issued monthly. The initial issue of each magazine is well prepared and beautifully printed. The first issues are 16 pages and profusely illustrated. The job is outstanding and unusual with a professional touch that leads us to predict a worthwhile future.

Copperweld Gets Fourth "E"

Copperweld Steel Company has added a third star to the Army-Navy "E" pennant flying over its Glassport, Pa., plant.

The award was given for excellence in the production of Copperweld wire for communication purposes on all battle fronts. One of the spectacular war uses of their products was the 10,000 miles of Copperweld telephone wire strung along the strategic Alaska Military Highway, where it carries the weight of wind and ice in a rigorous climate.

"Because the men and women of Copperweld believe in and practice the ideals for which the Army-Navy "E" Award stands, we are extremely proud to announce that they have received this award for the fourth time," states W. J. McIlvane, executive vice president of the company.

STROMBERG-CARLSON
RECOMMENDS—

"Eveready"
"Columbia"
"Gray Label"

The quality cell preferred by telephone engineers

Long Life Telephone DRY CELLS

- Higher sustained voltage.
- Longer life.
- Rock-bottom economy.

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready" "Air Cell" Operators' Transmitter Batteries.

RAYTHEON RectiChargeRs MEET POWER SUPPLY DEMANDS

Cover Open

Completely automatic in operation, a Raytheon RectiChargeR connected to your batteries provides an automatic A.C. — D.C. power supply system. Because it is entirely automatic and requires no attention, it is ideal for both unattended or central stations. Simply connect the RectiChargeR into the A.C. source and connect the output to batteries and it will keep the batteries fully charged.

RectiChargeRs—

- Keep batteries fully charged.
- Prevent overcharge and undercharge.
- Eliminate voltage variations.
- Increase battery life as much as 40%.
- Reduce battery maintenance and inspection to once or twice yearly.
- Complete range of units — 11/12 & 22/24 cells . . . 1 to 12 amps . . . many models for 50 cycles input.

Write for Bulletin DL 48-263B.

STROMBERG PROGRESS IN TELEPHONY CARLSON

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PLAN of Radio Relay Stations for Long Distance Telephone

THE American Telephone and Telegraph Company moved ahead on its trial of microwave radio transmission by filing application with the FCC for authority to construct seven relay stations between the terminals of the New York-Boston radio relay project. FCC approval on the two terminals was granted last year.

Purpose of the trial is to determine in practical operation the relative efficiency and economy of radio relay for transmission of long distance telephone messages and of sound and television programs, compared with transmission over the familiar wires and cables and the recently developed coaxial cable.

Bell System scientists view radio relay as a promising means of attaining very broad bands of transmission which can be carved into different channels for telephone and telegraph messages and for sound broadcast and television programs. A technique by which this can be done on the new coaxial cable systems has already been developed by Bell Laboratories.

Sites for the relay stations, about 30 miles apart, were chosen for their elevation. This not only takes into account the fact that microwaves do not travel much farther than the horizon, but it also puts the transmitting and receiving antennas well above intervening obstructions so that the waves can be beamed from hill to hill.

Buildings will be erected at the seven relay points, to house transmitting and receiving apparatus. At each station, highly directive antenna systems will pick up and amplify the radio waves and beam them on a direct line-of-sight path to the next station.

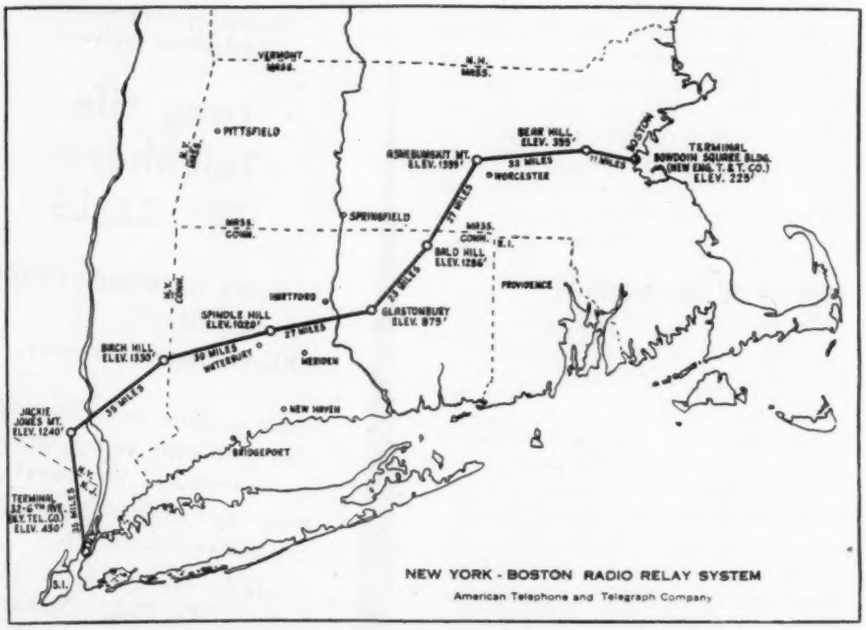
Field work on the project this year is expected to include building roadways up the hillsides to the relay stations, and preparing for connections with power and telephone lines.

The New York-Boston experiments are planned in three parts of the radio frequency spectrum—near 2,000, 4,000 and 12,000 megacycles. Eight channel assignments, each 20 megacycles wide, are bein grequested from the FCC in each of these parts of the spectrum. It is planned to use the eight channels to provide two simultaneous transmissions in each direction, with different frequencies in adjacent relay sections.

If the experimental facilities prove as satisfactory as the radio engineers expect, and if this method of transmission is found to be economically feasible, apparatus will be standardized in order that similar systems may be installed on other routes throughout the country as the need develops. The same set of frequencies can be used over and over at alternate relay stations on these systems. In cases where two or more systems radiate from one terminal or where branch circuits connect with the backbone network, additional frequency assignments may be necessary. The probable later addition of spur connections to nearby cities and towns points to a spreading out of radio relay channels in all directions from a backbone network. It is entirely possible that the radio relay systems eventually will be connected with the Bell System's coaxial cable network for nation-wide telephone service and for sound and television program transmission.

The New York-Boston route was selected for the experimental trial of microwave radio relay because of its nearness to the Bell Telephone Laboratories in New York and because of the continuing need for additional facilities between these two cities. Also, with coaxial cable already in place between New York and Washington, completion of the radio relay system would provide very broad band transmission facilities all the way from Boston to Washington.

It is expected that at the completion of the experiments, the facilities will be available for commercial use. At that time applications will be filed with the FCC for commercial licenses.



The intermediate relay stations between the terminals of the New York-Boston radio relay project will be built on the following sites, reading from left (New York) to right (Boston) on the map: Jackie Jones Mountain, 35 miles up the Hudson from the New York terminal in lower Manhattan, the mountain, west of the river is in Haverstraw Township, 5 miles west of Stony Point N. Y.; Birch Hill, in Patterson Township, 5 miles southeast of Pawling, N. Y.; Spindle Hill, in Wolcott Township 4 miles southwest of Bristol, Monn.; John Tom Hill, 7 miles east of Glastonbury, Conn.; Bald Hill, in Stafford Township, 3 miles east of Staffordville, Conn.; Asnebumskit Mountain, in Paxton Township, 5 miles northwest of Worcester, Mass.; Bear Hill, one mile northwest of Waltham, Mass., and 11 miles west of Boston. The New York terminal will be atop the A.T.&T.'s Long Lines Building, while the Boston station will be on the Bowdoin Square Building of the New England Tel. & Tel. Co.

Sales Representative For Stromberg-Carlson

Carl G. Howard has been appointed railroad sales representative of the Stromberg-Carlson Company, it was announced here this week by Lloyd L. Spencer, vice-president and general sales manager.

Carl G. Howard

Mr. Howard brings to his new post as factory representative of the Rochester, N. Y. telephone and sound equipment manufacturing firm, a broad intensive background in the engineering and sales phases of the railroad communications and signal equipment field.

A native of Newark, Ohio, he attended the Dodge Institute of Telegraphy, Valparaiso, Ind., and the Lewis Institute in Chicago, Ill. Mr. Howard holds membership in the Illinois Athletic Club and the Western Railway Club, both of Chicago, Ill.; the American Institute of Electrical Engineers and the Western Society of Engineering, and the signal and communications section of the American Association of Railroads.

Mr. Howard will continue to make his headquarters in the Engineering Building, 205 Wacker Drive, Chicago.

All Aluminum Industrial Ladders

A complete line of industrial ladders in all-aluminum tubular rail and channel rail construction is being announced by Duo-Safety Ladder Corporation as available for immediate delivery. All aluminum construction offers the advantages of light weight plus greater strength and safety, desirable for telephone men. For further information or a booklet on this line of all-aluminum ladders, write New Products Editor, TELEPHONE ENGINEER & MANAGEMENT, 7720 Sheridan Rd., Chicago, Ill.

STROMBERG-CARLSON

Recommends...

DIAMOND C

Creosoted Yellow Pine

POLES

Mfd. by Colfax Lumber & Creosoting Company, Inc.

COLFAX Creosoted Yellow Pine Poles are carefully graded according to physical properties desired and treated with 8 lbs., or more if you wish, of Grade No. 1 Creosote Oil in accordance with AWPA specifications.

Each pole is treated full length under pressure with the finest and cleanest creosote oil obtainable.

Reduce losses in revenue due to pole failures—specify:

DIAMOND C

Creosoted Yellow Pine Poles

HEMINGRAY INSULATORS

Favorably Known Since 1870

Hemingray No. 43—Has top groove for long spans in mountainous country.

Tops In Quality

. . . . is insured in every Hemingray Insulator. Exacting laboratory control—every batch of glass is checked ***hourly*** with precision instruments.

That's why Hemingray Insulators are still in service after 20, 30—even 50 years. Hemingray Insulators never fail to give dependable, long-life service.

Insist on Hemingrays for low operating costs.

STROMBERG-CARLSON COMPANY

STROMBERG PROGRESS IN TELEPHONY CARLSON

Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

STROMBERG-CARLSON Recommends...

The
CHURCHILL
No. 100 Folding Door TELEPHONE BOOTH

Booth provides comfort and privacy for your customers. You will find them repeatedly returning to use your **CHURCHILL** Booth and increase pay station business.

It is constructed as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector.

The **CHURCHILL** Booth is made of selected white oak and is available in light or medium oak in a satin finish.

Included as standard equipment are electric light and automatic electric ventilator.

Overall height is 84¾"; width, 29"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.

HABIRSHAW

No. 17 Bronze Drop Wire

Distributed Exclusively by

STROMBERG-CARLSON

High strength bronze conductor . . . expertly blended synthetic rubber insulation . . . soft, unbleached cotton braid, thoroughly saturated to provide a long-lived moisture-resisting covering.

A Quality Product Made by

Phelps Dodge Copper Products Corporation

Habirshaw Cable and Wire Division

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Factory and General Offices: Rochester 3, New York, U.S.A.
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Another Small Business Bill

Clyde Bailey, executive vice president of USITA, reports that another bill to help small business has been thrown into the hopper. This one, H. R. 2994, was introduced by Congressman Randolph (D. W.Va.). It would create a Small Business Finance Corporation and authorize it to issue bonds and other obligations up to one billion dollars, as well as to borrow from any Federal Reserve Bank. The amount of individual loans to small business, to be made by it, could go as high as $250,000. The rate of interest would be fixed by the lending corporation. Its Board of Directors would be authorized to "establish standards for the extension of credit . . based principally on the character and experience of the management of the applicant business and on the economic opportunities in each individual case" The bill contains no definition of small business.

"Committee on Period One" Formed by War Production Board

Deputy Director Charles Weiler of the Office of War Utilities and other leading OWU staff members are now engaged in a concentrated effort to work out the details of the problems involved in modifying and relaxing war-supporting production controls for the communications and public utilities fields and all other industry to formulate an overall pattern as a guide in aiding civilian production now that V-E Day has occurred.

To implement this work, WPB Chairman Krug has formed a new committee to be known as the "Committee on Period One"—the name given to the time expected to lapse before victory over Japan. The committee, which has already been at work and has rendered some subcommittee reports, is similar in composition and duties to the committee on demobilization of controls after V-E which was set up by WPB last Fall when defeat of Germany looked imminent. Chairman Krug emphasized that it will be the policy of the "Period One" group to consult with all segments of industry so far as possible before final action is taken and to ensure coordination of all government reconversion plans.

The chairman of the new committee is J. D. Small, WPB executive officer and the vice chairman is Sam W. Anderson, program vice chairman and requirements committee chairman. Mr. Weiler will represent the utilities and communications fields on the top committee. He has followed carefully the

activities of the Communications Division during the latter group's functioning and has attended most of the Telephone Operations Industry and Equipment Suppliers Advisory Committee meetings so that he will be cognizant of the telephone industry's reconversion problems in his new duties.

According to late figures received during April by the Communications Division, two Independent manufacturing companies — Leich Electric and Stromberg-Carlson—estimated that they had substantially met their quotas for the first quarter of 1945 in the production of civilian telephone instruments. Military orders prevented the other companies from filling their quotas.

Toll Charge Granted Monthly Rate Reduced

On the application of Carolina Mountain Telephone Company for authority to charge tolls on all messages from its Candler-Enka Exchange to the Asheville Exchange of the Southern Bell Tel. & Tel. Co., the North Carolina Utilities Commission granted, effective May 1, a toll charge of 10c per call from the Enka Exchange to the Bell Asheville Exchange, but reduced the monthly rates for subscribers of the Candler-Enka Exchange. The commission reported that an excessive number of toll calls were made under the free basis from Enka to Asheville in comparison with the charged for calls from Asherville to Enka, and that the company had higher rental rates than usually charged throughout the state in view of the free toll heretofore permitted.

USITA Enlarges Rural Telephone Legislative Committee

The new membership of the USITA Committee on Rural Telephone Legislation with an enlarged number was announced during April by the association. The new chairman of the committee is Oscar Burton, president of the Texas Telephone Association, in place of Carl D. Brorein of Tampa, Fla., who asked to be relieved of the chairmanship because of other duties but who is continuing as a member of the committee. The other members of the committee are F. S. Barnes of Rock Hill, S. C.; H. V. Bozell, President of the General Telephone Corp.; W. B. Clay of Hutchinson, Minn.; Minor Corman of Atmore, Ala.; D. O. Hood of Portland, Ore.; and Samuel Tucker of Pleasanton, Kan. Frank S. Bohn of Fort Wayne, Ind., has asked to be relieved of his membership on the body.

STROMBERG-CARLSON RECOMMENDS...

MINUTES SAVED The Job is RIGHT!

DILLON DYNAMOMETERS *accurately* determine the pound pull on power, transmission, and guy strand. Direct readings save valuable time. Ordinary workmen can easily operate the

DILLON DYNAMOMETER

Specifications:

- Mechanism not injured by overload
- 1/4" shatterproof safety glass crystal
- Will withstand full shock recoil
- Large, easy-to-read numerals
- Compact (8 1/4" x 6 1/4" x 3")
- Light in weight (8 lbs. 4 oz.)
- Galvanized shackles will withstand 25,000 lbs.
- Certified Accuracy
- Readings directly in lbs.
- Low Cost.

For Years of Reliable Service, Insist on the

DILLON DYNAMOMETER

A Precision Instrument for Precision Line Testing

Accurate Dependable Rugged

ARMSTRONG'S "Whitall Tatum" GLASS INSULATORS

107 years of glass-making experience are back of Armstrong's "Whitall Tatum" Glass Insulators—made by the Armstrong Cork Company.

Raw materials are rigidly tested . . . quality of glass is regularly checked . . . each stage of production is automatically controlled.

TOUGH!

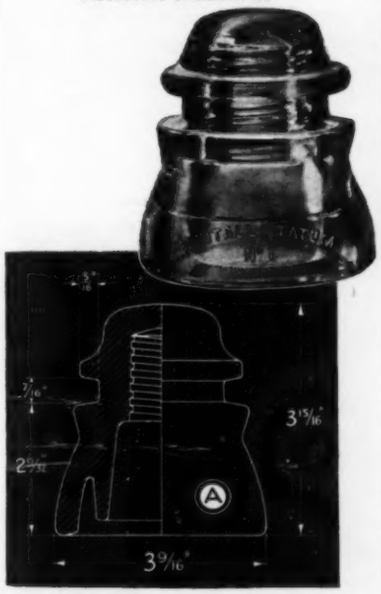
Armstrong's Glass Insulators withstand all weather conditions. In torrid heat . . . in extreme cold . . . in deluge . . . in blizzard . . . these rugged insulators have proved they can "take it".

Tests show that transverse strength exceeds that of supporting pins.

Other characteristics of Armstrong's Glass Insulators are:

Accurate dimensions
True pin fit
Crystal clarity

Conform to—or exceed—A.S.T.M. standards



STROMBERG-CARLSON — PROGRESS IN TELEPHONY

STROMBERG-CARLSON COMPANY

Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Walter Dakin is Elected President General Telephone's Central Group

Walter Dakin, newly-elected president of the central group operating companies of General Telephone System, announces several changes in the organization of Commonwealth Telephone Company (Wisconsin), Illinois Commercial Telephone Company, Pike County Telephone Company, Central Illinois Telephone Company, and Illinois Standard Telephone Company.

Mr. Dakin succeeds J. F. O'Connell of Madison, who has retired due to ill health following a serious illness.

H. W. Pike has been elected a vice president, and W. O. Trettin has been appointed chief engineer of the companies comprising the group.

In addition to his election as president of the central group companies, Mr. Dakin was also appointed general manager of the Commonwealth company.

Walter Dakin has had a long and successful career in the field of telephony, which started in 1906 with the Chicago Telephone Company as time and material keeper on underground construction. Various promotions led to the position of plant engineer in 1912, and later he was appointed appraisal engineer for the Central Group of Bell telephone companies operating in Ohio, Michigan, Indiana, Wisconsin and Illinois. In 1927 be became general plant superintendent of Commonwealth and its associated companies, and in April, 1944, was made vice president and chief engineer of the central operating group companies. He also became a director of Illinois Commercial in 1932, and of Commonwealth in 1944.

Walter Dakin

H. W. Pike

H. W. Pike, newly-elected as a vice president of Commonwealth and the Illinois companies, joined the group staff at Madison in 1928 as general auditor. Mr. Pike was later transferred to other group positions as commercial engineer, commercial superintendent, and rates and tariffs engineer. He was also recently elected a director of the companies comprising the central operating group.

Mr. Pike graduated from the University of Nebraska college of business administration, and took graduate courses in business statistics at Columbia University and in auditing at New York University.

W. O. Trettin, the newly-appointed chief engineer of the central group, entered the employ of the Tri-State Telephone and Telegraph Company, St. Paul, Minnesota, in 1910 in the equipment department, assigned to central office equipment maintenance, later being advanced to equipment engineering assignments. In 1913, he entered the employ of the Alberta Government Telephones, Edmonton, Canada, as an equipment engineer, leaving in 1916 for service with the Canadian Signal Corps.

After returning in 1919, Mr. Trettin was assigned to appraisal work assisting the J. G. Wray Company organization then engaged in an appraisal of the government system. Later he was advanced to purchasing agent for the government system for two years, and was outside plant engineer for seven years. The early post-war years of that period were marked by intense telephone construction activity in Western Canada, and he effected material economies by working out long span construction designs. In 1929 he joined the J. G. Wray Company organization and was assigned to the Central Carolina Telephone Company as plant superintendent in charge of a rebuilding and conversion program for 30 exchanges, which was completed in 1930.

In 1931, after acquisition of the Central Carolina Company by the predecessor of the present General Telephone Corporation, Mr. Trettin was transferred to the central group office at Madison as general plant engineer. Later he received appointments as assistant general plant superintendent and assistant chief engineer of Commonwealth and Illinois Commercial. He is a registered Professional Engineer, State of Wisconsin.

J. F. O'Connell, retiring president of the central group companies, was one of the original incorporators of Commonwealth Telephone Company in 1920, and had been an operator of telephone properties in Wisconsin since 1917. He was also one of the organizers of what is now General Telephone Corporation, which is the largest independent tele-

years. The early postwar years of that

Mr. O'Connell is well known in the telephone industry, having served as president, director, and on several committees of the United States Independent Telephone Association.

W. O. Trettin

D-X Radio Products Company Making Toroid Cores

D-X Radio Products Company, one of the few firms able to turn out Toroid Coils, announces production of these components for telephone and electronic purposes. They have high permeability cores that are hydrogen annealed and heat treated by a special process developed by D-X engineers working with several of America's outstanding scientists.

D-X Radio Products Company is located at 1200 Claremont Avenue, Chicago, and officials state production facilities for immediate delivery of Toroid Coils are available.

Purchase of Spanish Telephone Awaits Approval of Cortes

The purchase of the Spanish National Telephone Company by the Spanish government only requires one more step — the approval of the Spanish Cortes (Parliament).

An official decree of the Spanish government, approved at the last cabinet meeting, for the acquisition and nationalization of the Spanish telephone system was published in the Official Gazette April 16. This decree authorized the Finance Minister to issue for the Spanish government $50,000,000 in 16-year bonds bearing an interest rate of 4%. The Ministry authorized the issue of ten $5,000,000 provisional bonds which are valid until the regular issue is prepared. The regular issue will be in bonds of $1,000 each.

The purchase price from the I.T.&T. which will be the acquisition by the Spanish government of 318,641 shares of Spanish Telephone Co.'s stock held by the I.T.&T. or 79.8 percent of the outstanding stock, will be $56,798,752 (U.S.). The I.T.&T. is retaining 300 common shares with a face value of 2000 pesetas per share—the same purchase price as that of the Spanish government. The balance of the purchase price is to be paid by the Spanish government under the arrangement of a short-term note.

The decree stated that the I.T.&T. may purchase more stock after the transfer of control if it desires. Previously, the Spanish government had approved the transfer from the telephone company to the I.T.&T. $20,000,000 in past profits, management and engineering charges and other receivables.

With the receipt of the payment after the Parliament approval, it is expected that the I.T.&T. will engage in a refunding operation to retire some of its fixed indebtedness that is nearing maturity.

STROMBERG-CARLSON
RECOMMENDS—

Crapo STEEL STRAND

1—HIGH STRENGTH
2—RUGGEDNESS
3—LONG LIFE
4—ECONOMY

The superior tensile strength that only steel can give . . . . the ruggedness to withstand severe punishment . . . the ability to outlast normal needs . . . . all these are combined—with outstanding economy—in **Crapo** Galvanized Guy and Messenger Strand.

Long life and low maintenance costs are characteristic of this time-tested product. Heavy, ductile, tightly-adherent zinc coatings, applied by the **Crapo** Process, provide lasting protection against corrosion. The inherent strength and endurance of the steel makes for dependable, maintenance-free service.

Crapo Galvanized Products also include **Crapo** HTL-85 and HTL-135 High-tensile, Low-resistance Line Wire; E.B.B., B.B. and Steel Telephone Wire; Construction Wire; Tie Wire, and Ground Wire.

SUB-CYCLE

A Powerful RINGING CURRENT

. . . that meets the EXACTING REQUIREMENTS of your needs. SUB-CYCLE has proven its superiority under the most severe operating conditions because it has . . .

★ No Moving Parts
★ Requires No Routine Maintenance
★ Nothing to Lubricate
★ No Radio Reception Interference
★ Economical, Quiet Operation

To Suit Your Demands
6 Models

Ranging from outputs of 7½ to 45 watts covering use from P.B.X.'s to large central offices.

"The Choice of the Telephone Industry"

STROMBERG-CARLSON COMPANY
Factory and General Offices: Rochester 3, New York, U. S. A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Telephone in China is Confusing Gadget, Says Writer Just Returned

By GEORGE GRIM

Telephone wire is delivered by coolies who lick the problem of bringing up supplies over the most difficult trails imaginable. A Chinese sergeant reports to a United States major the total footage of wire in the coolies' loads.

(Signal Corps photo)

THE most maddening and confusing gadget in wartime China is the telephone. One day, the party on the other end may hear you and you can't hear him. Next time, you hear him and he can't hear you. Often, you can't hear each other.

Two out of three calls you put through during peak hours give you a busy signal. You are likely to get almost anybody on the wire, speaking almost any language. Except that national word of the Chinese telephone— "Wei!" (You pronounce it "Why!")

The first rule of the Chinese telephone is to keep talking. So you keep shouting "Wei! Wei! Wei!" So does the fellow on the other end. Sometimes you get some business transacted.

Mr. Grim, who wrote this article on the telephone in China, recently rejoined the Minneapolis Star Journal and Tribune staff on his return from China, where he was director of foreign broadcasting for the Chinese government. The article is one of a series entitled "Grim's Tales from China."

We thank Sig Bergh, Editor, and "The Northwestern Bell" for sharing Mr. Grim's interesting feature.

I decided to take a look at the phone company, which is government-operated. When I saw it, the tien wah ("electric words") became a minor miracle.

Six years ago the telephone equipment from Hankow and Canton was hastily dismantled, carried by boat and coolie to Chungking. Half of the equipment had been made in Germany, the other half by a Chicago company. There wasn't enough—and still isn't—to make one system do the job. So the American and the German system had to be adapted to work together.

No sooner did that job start when the big bombings of 1940 laid low one out of every three wires in Chungking. Poles were disintegrated, wires blasted into bits. More bombings followed.

Two days after the first big bombing, one of the biggest construction jobs of this war in China was started—a telephone exchange so far underground that no bombs could hit it.

For exactly 555 days there was blasting and digging, with time out for ducking the frequent Jap air raids. Now the Chungking telephone exchange is under 50 feet of solid rock.

Here the horribly overloaded equipment struggles to keep up with the flow of voices shrieking "Wei! Wei!"

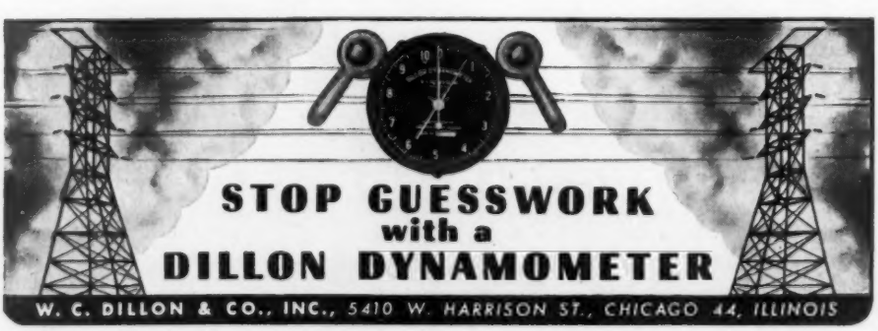
Underground cables are found in many parts of Chungking. But a usual sight when you walk into the countryside is the nest of telephone poles, with wires running at all angles, in all directions. Below these humming wires are the rice paddies, being cultivated as they have been for thousands of years.

You can't call very far in China. The longest long distance call is a round-robin circuit of 700 miles.

In Chungking, a city of more than a million people, there are only 2,500 phones. Each subscriber tries to put through 120 calls a day. Or, sometimes, it seems like the same call 120 times! During peak hours, the overheated underground exchange handles 40,000 calls an hour.

The men of the telephone company never get much rest. Repairing equipment, with no spare parts . . . patching up fallen open-wire circuits with odd bits of old wire . . . trying to smooth ruffled subscribers . . . keeping the Berlin and Chicago systems working together in their subterranean dugout . . . all adds up to one of China's unenviable jobs.

The new phones they are making now are carved by hand, out of wood. And strange as it may seem, they, too, say "Wei!"



USITA Adv. Committee Discusses Telephone Advertising Institute

THE progress and future plans of the Telephone Advertising Institute were principal topics of discussion at the meeting of the Advertising Committee of the United States Independent Telephone Association held April 30 in Chicago.

Carl Spaid of Kansas City, Mo., and C. C. Pearce of Riceville, Iowa, new members of the committee, were especially welcomed by chairman Leon F. Roberts, Jamestown, N. Y. Mr. Roberts also commented on the 100% attendance at the meeting. Other committee members present included: Verne B. Clark, Pekin, Ill.; J. Hartwell Jones, Tampa, Fla.; Frank D. McCarthy, Erie, Pa.; and R. C. Reno, Chicago. R. A. Phillips, former chairman of the committee, also attended part of the meeting. The Institute was represented by Betty Gray, Elinor Bishop, Nathan E. Jacobs, and Philip Rouda, of Bozell & Jacobs, Inc.

In his opening remarks, Mr. Roberts pointed out that it was just a year before that the Institute was created to provide an industry-wide advertising and publicity service at a nominal cost. Promotion begun then resulted in actual service being started in September, and 770 Independent telephone exchanges are now using Institute material. The committee expressed hope and confidence that the few remaining system and holding companies would soon become Institute subscribers, and that still more of the small Independent companies will also take advantage of the economical service.

The report given by Betty Gray on her survey of representative Institute subscribers was approved and discussed thoroughly by the committee. Her survey was made in order to obtain a clear picture of the advertising needs of the Independent telephone industry and to determine how effectively Institute material is fulfilling these needs.

Both large and small companies in all parts of the country were contacted. Many were interviewed personally, and, where time prohibited further travel, companies were queried by mail.

Committee members agreed that the report contains the opinions of a representative cross-section of the Independent telephone industry and can be used as an accurate reference in making future advertising plans.

Following are highlights of Miss Gray's report:

The companies contacted indicated general satisfaction with the advertising service thusfar, and the majority were very enthusiastic about its value to both their particular companies and the industry as a whole. Many detailed suggestions and constructive criticisms were offered, which will help the Institute provide a service even better fitted to each company's advertising needs.

NEARLY all companies surveyed are using the Institute's posters, counter and booth cards. They expressed satisfaction with appearance and subject matter and are especially pleased with the new four-color printing. Many additional subjects were suggested for coverage in the display materials, including the following:

Reasons why subscriber should bring bill when paying it.

Taxes and the part they play in the industry.

Children's excessive use of telephone.

HELP WANTED—MALE—Con.
HELP WANTED—MALE—Con.
HELP W
Here's News!!!
WORK WANTED
No shortage of properly trained and experienced MAN POWER here to take over your TELEPHONE DIRECTORY ADVERTISING, handle all details, and produce MORE NET REVENUE.
Write or Call At Our Expense
LOOMIS ADVERTISING CO.
CITIZENS TRUST BUILDING
FORT WAYNE, INDIANA
NEW YORK LIFE BUILDING
20 WEST 9TH STREET
KANSAS CITY 6, MISSOURI
135 SOUTH SECOND ST.
PHILADELPHIA 6, PENNA.

Short platforms assist in handling many repair jobs
With old equipment having to carry on, the need for repairs naturally becomes more frequent. Often the repair jobs are more difficult and more prolonged. For such jobs the short TIPS ECONOMY PLATFORM usually comes in handy; especially in making repairs that are inaccessible with climbers and belt, or on jobs that are prolonged because of help shortage or the extensive repairs required.
These platforms attach to either wood, steel, or concrete posts. They are made in 24" and 30" lengths and will support as much as 850 pounds.
If you have one of these around the place, you'll find good use for it in repair work. If not, write for details.
A·B·CHANCE CO. CENTRALIA MISSOURI

Party line.

Long distance instructions.

Patience and courtesy.

Fewer companies are using bill inserts and employee pamphlets in quantities, but many indicated their intentions of using these materials in the future. The following were included in suggestions for bill inserts:

Reasons for rate increases.

Care in dialing.

Postwar plans for improved service.

Allowing called party enough time to answer.

Prompt payment of accounts.

The attractions of working for the telephone company, and the importance and pleasantness of telephone work were suggested as employee pamphlet subjects.

The importance of newspaper advertising was indicated by the fact that all but one of the companies surveyed make use of the Institute's mats, and more complete criticism and discussion were given to this item of the survey.

Twenty possible subjects were suggested for newspaper advertising, and from these the committee selected several for particular emphasis during the next few months. A general need for advertising on rural telephone service, manpower shortages, and the value and low cost of telephone service was indicated.

News release and radio spot announcements are being used by many subscribers, although some companies indicated a greater need for these items in the postwar period.

A large percentage of the companies contacted showed a definite interest in several of the advertising items which were tentatively planned for the future. Subscribers expressed a need for truck posters, movie trailers, employee posters, envelope mats and campaigns on rate raising, dial conversion and telephone directory. The Institute will investigate further the need for these items and make definite plans for the preparation of those in which sufficient interest is shown.

W. C. Dillon & Co. Appointment

Robert A. Highland is the new assistant sales manager of W. C. Dillon & Company, Inc., Chicago, Illinois, manufacturers of dynamometers, bisectors, test sets, temperometers and other instruments.

Robert A. Highland

Mr. Highland, a graduate of De Paul University and well versed in the communications field, will handle general and technical sales correspondence, contact Dillon jobbers and sales representatives and deal with export problems.

New Company

The Lycoming Telephone has been formed from a consolidation of the operations of the former Loyalsock (Pa.) and Ralston (Trout Run, Pa.) Telephone Companies. The Lycoming company will operate exchanges at Loyalsock and Trout Run, serving some 650 stations. Mr. L. E. Hyle is the manager of the new company.

P&H PENTA POLES
FULL-LENGTH TREATED NORTHERN WHITE CEDAR
'45 P&H PENTA
P&H Penta Treatment insures against Sapwood deterioration and termites.
PAGE AND HILL CO.
MINNEAPOLIS, MINNESOTA · 50 CHURCH STREET, NEW YORK, N. Y.
Distributed by AUTOMATIC ELECTRIC SALES CORPORATION STROMBERG-CARLSON COMPANY
"STILL IN THE LEAD"

Photo by U. S. Army Signal Corps

58,000 mile Life Line

MORE than 58,000 miles of Spiral-4 cable have been made by Western Electric for our armed forces. Above, you see Signal Corps men plugging together the quarter-mile lengths and attaching them to a messenger strand for service as an overhead line in Italy.

This rubber covered cable—designed for use with carrier equipment which provides three telephone and four telegraph circuits over four wires—was intended for laying on the ground. It has been pressed into service for aerial lines, buried lines, and even under-water lines.

All types of telephone equipment will be needed in increasing quantities to establish and maintain these life lines of communication. Until the job is finished, production of war equipment must be the chief responsibility of Western Electric.

During the 7th War Loan Drive, buy bigger, extra War Bonds!

Western Electric

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.
IN WAR...ARSENAL OF COMMUNICATIONS EQUIPMENT.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

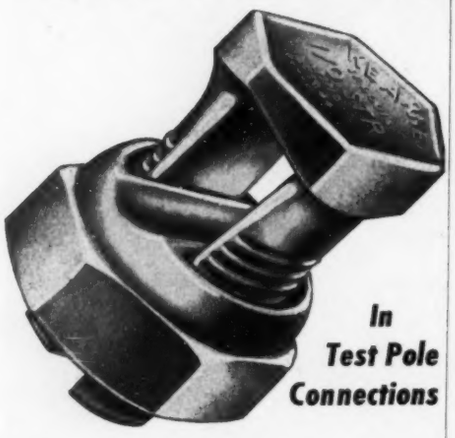
DISTRIBUTED THROUGH JOBBERS

TELEPHONE ACCESSORIES

For Speed, Efficiency & Economy

in Connecting Bridle to Arm of Open Wire

for Test Points Dead-ends or Buck Arm Corners



In Test Pole Connections

Use KEARNEY SOLDERLESS CON-NEC-TITES

Kearney Con-nec-tites are designed to make every standard telephone connection quickly, efficiently, and economically. They are made of pure copper with nuts of high grade bronze for resistance to weather.

The No. 86-7 Connector for No. 10 and No. 12 copper wire is made for use with a standard terminal wrench. A firm, high pressure connection results whenever you use Kearney connectors.

FOR COMPLETE INFORMATION AND PRICES SEE YOUR JOBBER OR WRITE

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. ST. LOUIS, (10) MO.

Radio Course For Telephone Men

(Continued from page 37)

photographic film, it is only necessary to place the film under the part to be photographed and allow the X rays to pass through the human tissue (or other object) from the opposite side. The more dense portions such as bones tend to filter out the X rays, thereby giving an outline on the photographic plate of the bones, dense tissues, etc.

X rays are generated by accelerating electrons to a high speed by means of high voltages and then causing them to strike a tungsten target in the evacuated X-ray tube. This sets up the high frequency X-ray vibrations. Fig. 20 shows schematically how an X-ray tube functions.

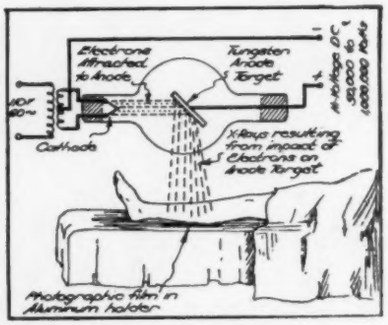

Electrons Attracted to Anode
Tungsten Anode Target
Cathode
X Rays resulting from impact of Electrons on Anode Target
Photographic film in Aluminum holder

Fig. 20—Use of X rays in medicine.

The Gamma Ray Frequencies

HIGH frequency radiation having many of the characteristics of the X-ray frequencies and which in some respects are equally useful for medical purposes are *Gamma rays.* These are found in the frequency band directly below X rays. Gamma rays are obtained primarily from radium from which they are spontaneously emitted. They are useful for treatment of certain diseases, particularly cancer.

Cosmic Ray Frequencies

ABOVE the Gamma ray frequencies we have what are known as *Cosmic rays.* These rays are thought to come from interstellar space and have the ability to penetrate through many feet of lead, whereas lead of equal thickness will filter out all other types of radiation.

Thus we complete our electrical yard stick extending from the lowest to the highest frequencies and embracing the radio frequencies which are of course our primary interest in this course.

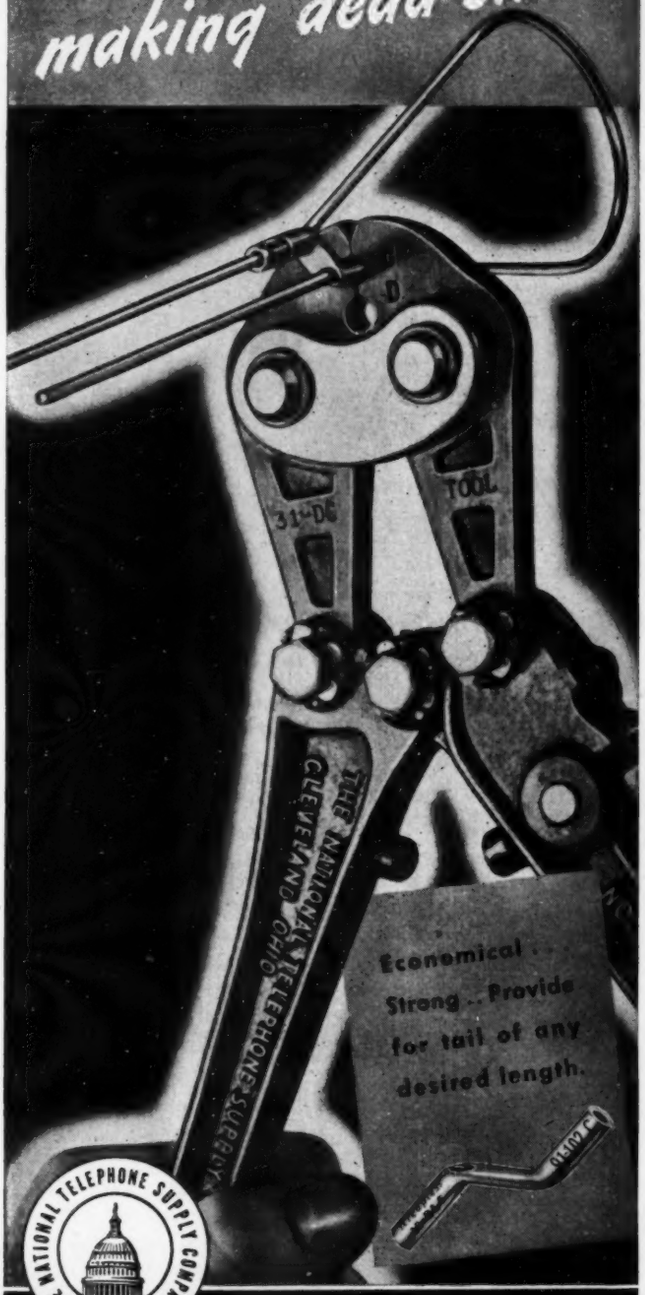
(Part 1 of Chapter 3, will appear in the June 1 FORTNIGHTLY TELEPHONE ENGINEER.)

Examination Questions Chapter 1-2—Classifications of Radio Systems

1.—What is the basic difference between such physical manifestations as radio waves, infrared radiation, visible light, X rays, etc?
2.—Explain what is meant by subsonic frequencies.
3.—What is the overall range in cycles of the frequency spectrum?
4.—What is the hearing limit of the ear with respect to frequency of sound vibrations?
5.—Does the wave length increase or decrease as we increase the frequency of our alternating current source?
6.—Explain what is meant by supersonic frequencies.
7.—Explain the skip distance effect.
8.—What is one of the basic advantages of the higher frequencies with respect to antenna dimensions?
9.—Explain what is meant by the expression line of sight transmission path.
10.—Explain why reflected waves may be objectionable in television reception yet advantageous (in some cases) in the telephone and railroad fields.

Mail all examinations direct to Lincoln Engineering School—Box 931—Lincoln, Nebraska. Include 6c in stamps to cover return mailing costs.

You can't beat the Nicopress method of making dead-ends



THE NATIONAL TELEPHONE SUPPLY COMPANY

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

DRAKE — A NAME TO REMEMBER for RELIABLE SOLDERING EQUIPMENT

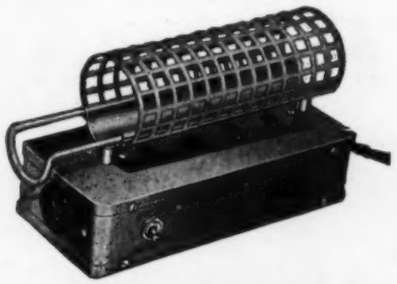
Through 25 years of soldering iron manufacturing, Drake has developed soldering products that set new high standards of quality and long-lived performance.

DRAKE No. 400, for example, is ideal for work in small places—weighs only 8 ounces and is only 9 inches long, yet it is a 60-watt iron.

DRAKE No. 600-10, is conservatively rated at 100 watts, but is only 10 inches long.

DRAKE SOLDER POTS

are available in 150 and 300 watt ratings to meet varying needs.



DRAKE HEAT CONTROL

is a fool-proof device for keeping idling irons ready for quick use.

*GraybaR QUALITY SINCE 1869 *REG. U.S. PAT. OFF. Distributed by *GraybaR ELECTRIC COMPANY

Immediate shipment from stock on moderate quantities with priority rating of AA-5.

DRAKE ELECTRIC WORKS, INC.

3656 LINCOLN AVE. CHICAGO 13, ILL.

Communications and Electronic Developments

Underground Cable Construction In France

European cities customarily utilize sewers as conduits for telephone cables and this use of sewers for telephone cables is of course prompted by Europe's perennial need to be economical in all civic installations. In American cities such underground cables are usually installed in vitrified clay conduits providing ducts only slightly larger than the cables which are pulled through by means of wire. Manholes are located on the duct lines approximately a city block apart, permitting splicing at convenient points. In the sewers of France the lead cables are merely racked along the dank walls.

The U. S. Signal Corps soldiers must carry necessary cable through the sewer as it is paid out to them from a huge reel brought on a specially constructed trailer to a position just above the sewer entrance. An officer of the unit usually has the job of supervising the paying out of the cable, but he wears hip boots like the enlisted men and descends to the sewer whenever necessary to aid in operations there. The cables are supported, one above another, by heavy metal racks fastened into the walls.

The final operation in rehabilitating telephone facilities is a complicated one. It consists in testing the cables and splicing them into the main control board of the city. One of the signalmen follows a cut sheet called the "brains," showing how the various pairs are to be spliced. Wires are scraped bare of insulation at the necessary points and the connecting wires are pigtailed to them, after which waxed cotton sleeves are adjusted to give these connections protection.

Signal Corps soldiers lay telephone cable for Allied military use on metal racks fastened into wall of French sewer. (U. S. Army photo)

Splicing a telephone cable into the main control board of a French city. As the various circuits in the cable are tested and identified, they are kept in order by being placed in the numbered holes of the boards. One of the signalmen holds the cut sheet or "brains," which indicates how the various pairs are to be spliced. Waxed cotton sleeves used to cover the parts of wire which have been scraped bare of insulation for splicing, not cigarettes, are in the box. (U. S. Army photo)

Signalmen are often able to avoid costly and time-consuming construction by repairing or rearranging facilities formerly used for civilian purposes and by utilizing civil works which have luckily escaped destruction by the enemy.

Electronic Air Cleaner

An electronic unit which will be available after the war and which should find application in telephone exchanges is the "Precipitron" *electronic air cleaner*. This device utilizes high voltage electrical charges to attract floating dust particles and thus remove them from the air. Large installations employing this principle have been in use for some time. The new units which will be available for homes and small business houses will be no larger than a small electric refrigerator. Their initial cost and expense of operation will be more than justified by the reduced relay maintenance costs as many cases of trouble are due to dirt in relay and jack contacts.

Kellogg Distributor For John A. Roebling's Sons Co.

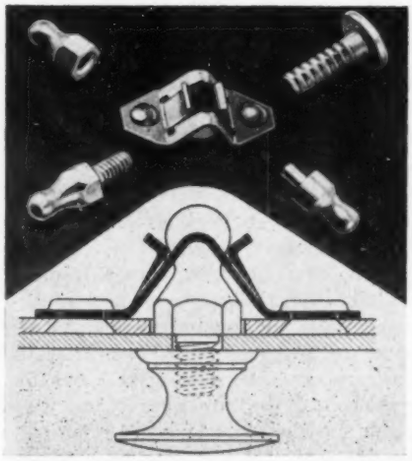
The Kellogg Switchboard and Supply Company of Chicago has been appointed to distribute Roebling lead encased telephone cables and Roebling bare copper wires to Independent telephone companies. Announcement of the agreement, which covers both the national and export fields, was made recently by Stuart E. Yeaton, Electrical Division sales manager of John A. Roebling's Sons Company, Trenton, N. J.

For a number of years Roebling has been manufacturing outstanding lead encased cables and bare copper wires as part of its extensive line of electrical wires and cables. Selection of the Kellogg Company as distributor is a tribute to the reputation it has built up in the Independent telephone field as supplier of all types of telephone equipment.

The new relationship between Roebling and Kellogg, according to officials of both companies, will result in improved service and more complete distribution of their combined products to Independent telephone operating companies.

New Spring Steel Latch

The new spring steel Speed Nut Latch No. 1663 has been developed for instant attachment and removal of box covers, access doors, panels and inspection plates. The spring arms snap over ball or grooved studs to provide firm attachment, yet studs may be quickly withdrawn. It is available in five degrees of pull-out tension. There are three styles of ball studs in various lengths to suit application requirements. Anyone desiring further information and samples may write Tinnerman Products, Inc., 2017 Fulton Road, Cleveland 13, Ohio.



New Tinnerman Speed Nut Latch developed for quick attachment and use.

For Heavy Duty Construction and Maintenance or For Light Line Work, It's

American

UTILITIES' BODIES and EQUIPMENT

EVERY TIME •• IN PEACE—AND IN WAR

MODEL DPL and DT
Line-Construction Body. Lengths 102", 116", 132", 144", 156" and 168".

MODEL 4460-L
Light Line Service Body. Lengths 75", 90" and 104".

Built into every American Body and piece of American equipment are many intangible plus values. Values that have assured users of increased efficiency and economy of operation and have made "Americans" preferred by a large percentage of the Utilities for construction, general service and maintenance work. Values that have also enabled "American Coach" to meet the Government's stiff requirements in building a large share of the Line Construction Bodies and Earth Borers for the armed services.

These special plus values are the result of accumulated engineering experience that has lived close to the Utilities for nearly half a century and to a new and varied experience gained in our government war construction assignments.

When Victory is ours and we can all turn once again to civilian production, from devoting our energies to winning the war, which of course is *first* now, "American" will produce equipment that will most completely meet every requirement for the many postwar jobs. Be prepared by using The American Coach Replacement Plan—Write for Details Today—

BUY MORE WAR BONDS

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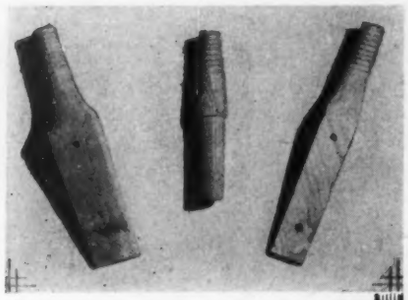

- **Clean-Cut Threads**
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Our stock of wood brackets and pins is of very good quality. Pins and brackets are always made from scrap, and increased war use of hard woods has provided better quality scrap.

Now is a good time to buy pins and brackets. Same prices —see the No. 61 Suttle Salesman Catalog.

DEPEND ON SUTTLE

Complete Text of Amended WPB Order U-2

(Continued from page 26)

(5) Subject to the provisions of (b) (4) (i) and (b) (4) (ii) above, operators shall regrade existing service to the extent necessary to provide service authorized by the War Production Board because of essentiality or unreasonable hardship.

(c) *Limitations on additional telephone.* (1) Residence extension service. Operators shall not install or reconnect residence extension telephones, residence extension bells, except loud ringing bells, or residence P. B. X. telephones, nor as a substitute provide additional main lines or stations on party lines. This provision has the following exclusions and exceptions:

(i) Temporary installations of one residence extension may be made when the operator finds it essential in cases of serious illness.

(ii) For practicing physicians and surgeons, the operator may install one extension telephone to meet professional requirements. The operator may also provide a connection with an answering bureau.

(iii) The installation and reconnection in residence quarters of telephones connected to private branch exchanges serving hotels, apartment houses, etc., may be made to the extent that no more than one such telephone may be provided in any residence quarters.

(d) *Limitation on replacements.* Operators shall not make replacements of P. B. X. systems with dial equipment.

(e) *Non-applicability to certain replacements and additions.* The terms of this order shall not prohibit wire communication projects approved by the War Production Board on Form WPB-2774 or other appropriate form.

(f) *Exemption of armed forces.* The restrictions of paragraph (d) shall not apply to facilities for the official use of the armed forces or the Veterans' Administration.

(g) *Engineering and planning.* All operators shall engineer all replacements or additions to central office equipment so as to limit the margin for expected growth of requirements to a period not in excess of one and one-half years.

(h) *Reports.* All operators affected by this order shall execute and file with the Office of War Utilities such reports as the Director, Office of War Utilities, shall from time to time require; subject to the approval of the Bureau of the Budget pursuant to the Federal Reports Act of 1942.

(i) *Appeals and applications.* Applications for relief under this order or appeals should be filed on Form WPB-2117, except for those concerning paragraphs (d) and (g) which shall be made on Form WPB-2774.

(j) *Violations.* Any person who wilfully violates any provision of the order or who, in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control,

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Doughnut Coils for telephone and electronic purposes. High Permeability Cores are hydrogen annealed and heat treated by a special process developed by DX engineers. Send us your "specs" today — ample production facilities for immediate delivery.
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A Simple, Up-to-the-minute Guide

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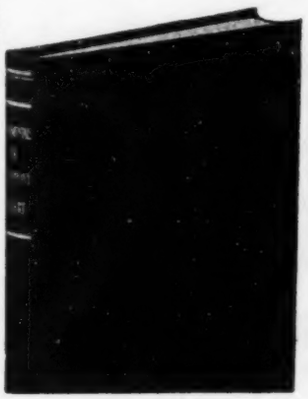

This first new telephone book in years provides the telephone worker with an understandable treatment of the technical aspects of his work, valuable as a key to better results and improved skill in any job he may undertake. The fundamentals of electricity and acoustics are covered, followed by a full elementary treatment of telephone equipment and circuits, their elements, characteristics, functions, etc.

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By ARTHUR LEMUEL ALBERT
Professor of Communication Engineering,
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374 pages, 5½ x 8½, 200 illustrations, $3.25

This book tells how and why telephone apparatus and lines operate as they do, covers the electrical theory and circuits with which every telephone worker should be familiar. It explains the phenomena of sound as they apply to telephony. It gives a practical knowledge of the functioning of transmitters, receivers, and other elements of telephone sets and systems, including modern manual and dial systems. It shows the requirements of local and toll transmission lines and how they are met, covering electrical measuring instruments, the measurements used in telephony, the problems of interference in telephone circuits, and other topics, in a clear, well-illustrated, elementary treatment, especially arranged for the non-engineering reader.

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1. Direct-current Theory
2. Alternating-current Theory.
3. Electric Networks
4. Sound, Speech, and Hearing
5. Telephone Transmitters
6. Telephone Receivers
7. Telephone Sets
8. Manual Telephone
9. Dial Telephone Systems
10. Transmission over Circuits with Distributed Constants
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Light in weight and does not interfere with use of phone in regular way. Simple to operate, requiring only slight pressure to hold. No more "cramped arm" or "sore ear" bugaboo of long conversation. Lasts indefinitely and has nothing to get out of order. Enables you to talk directly into the mouthpiece.

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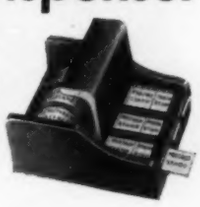

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I am herewith enclosing $.....as full payment for ......"Phone Ease" @ $1.50 each. ....."Handy Stamp Dispenser" @ $1.50 each.

Name .....

Address .....

City ..... State .....

and may be deprived of priorities assistance.

(k) *Communications.* All reports required to be filed hereunder, and all communications concerning this order, shall, unless otherwise directed, be addressed to: Communications Division, Office of War Utilities, War Production Board, Washington 25, D. C., Ref.: U-2.

Issued this 3d day of May 1945.

WAR PRODUCTION BOARD,
By J. JOSEPH WHELAN,
Recording Secretary.

SCHEDULE A—CATEGORIES TO BE ACCORDED PREFERENCE IN OBTAINING SERVICE TO THE EXTENT REQUIRED FOR THE PROPER DISCHARGE OF DUTIES IN DIRECT DEFENSE, PUBLIC HEALTH, WELFARE AND SECURITY

1. *Armed forces and government.* (a) Official Army, Navy, Marine Corps and Coast Guard Units and the Veterans' Administration. Office of Civilian Defense Units.

(b) Official Federal, State, county, and municipal government services.

(c) Official agencies of foreign governments.

2. *War production and directly related activities.* (a) Business concerns furnishing material, equipment or facilities under prime or subcontracts to the Armed Forces of the United States (or their suppliers) Petroleum operators for their oil or gas producing or drilling operations. The business offices of persons who regularly perform special services for these business concerns, such as consulting engineers, chemists, lawyers and accountants. The business offices of persons rendering special service in connection with construction of defense projects authorized by the War Production Board, such as contractors, engineers, and architects. Labor unions having bona fide collective bargaining agreements with business concerns identified in this Schedule A.

(b) Public transportation, pipe line companies, all types of public utilities.

(c) Business concerns who regularly maintain or service equipment essential to the Armed Forces, war production, public transportation, public utilities, and pipe line companies.

3. *Public health and welfare.* (a) Public or private organizations directly serving the public safety, health or welfare, such as hospitals, clinics, sanitoria, physicians, surgeons, dentists, nurses, nurses' registries, veterinarians, ambulance services, manufacturers or distributors (wholesale and retail) of drugs, surgical, medical, hospital or dental supplies or equipment, mortuaries, burial service organizations, the American Red Cross and similar agencies.

(b) Philanthropic and eleemosynary organizations recognized as such by the Bureau of Internal Revenue, including their fund-raising offices; United Service Organizations and other similar organizations; religious establishments and their officiating clergy; Christian Science Practitioners; public and private schools.

(c) Press associations, newspapers, radio broadcasting stations.

(d) The business or management offices of the new housing developments.

(e) Food processing, food distribution (wholesale and retail) and food storage organizations and producers of substantial quantities of food.

SCHEDULE B

Categories to be accorded preference in obtaining service in the order provided in paragraph (b) (2).

1. Residence service where the attending physician or surgeon certifies in substantially the form set forth in the Schedule B Certification Form (WPBI-2101) that there exists a condition of serious illness or pregnancy involving serious complications, that he must be called repeatedly at unpredictable intervals for emergency treatment and that in view of all the circumstances telephone service is essential. Such service shall be terminated within 30 days of the termination of the conditions specified above.

2. Residence service required where a person lives alone and the attending physician certifies in substantially the form set forth in the Schedule B Certification

IN THE early days of Industry, fine workmanship was encouraged by trade "Guilds." Craftsmanship reached high levels, spurred by the worker's desire to live up to the standards of his Guild shield or emblem. Later, craftsmen originated their own symbols or "Quality Marks" as a pledge of reliable merchandise.

Conspicuous today in the small tools field is the famous Vacuum Grip Trade Mark—just as truly a symbol of Quality as those old Guild shields.

For more than a quarter of a century we have maintained the high standards represented by this trade mark. Stamped on a pair of pliers it stands for material of the finest quality, linked with precision construction—our pledge of top performance and long life.

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Form (WPBI-2101) that such person is confined to residence quarters for a protracted period by reason of serious illness or physical disability and that in view of all the circumstances telephone service is essential. The phrase "lives alone" includes a person who is alone all day or during the day and night working hours, except for one or more children aged fifteen years or younger or another person similarly certified to be confined to residence quarters by reason of serious illness or physical disability. Such service shall be terminated within 30 days after the termination of the conditions specified above.

SCHEDULE C

Categories to be accorded preference in obtaining service in the order provided in paragraph (b) (2).

1. Residence service for the wife of a member of the armed forces of the United States or the merchant marine who is on active duty away from home, where she is pregnant and there is no one else in her household or where her household consists only of herself and one or more children aged fifteen years or younger and under the same circumstances for a widow whose husband died since January 1, 1940 while a member of the armed forces of the United States or the merchant marine. The applicant for service must certify to these facts in substantially the form set forth in the Schedule C Certification Form (WPBI-2102).

2. Residence service for those who discontinued residence service upon entering the armed forces of the United States or the merchant marine and who apply, within twelve months after being honorably separated or placed on terminal leave from the armed forces or the merchant marine for residence service within the area indicated in paragraph (b) (2) (v). The applicant for service must certify to these facts in substantially the form set forth in the Schedule C Certification Form (WPBI-2102).

Increased Rates On Conversion to Dial

The Minnesota Community Telephone Company, Elysian, Minnesota, was authorized April 16 by its state Railroad and Warehouse Commission to increase its rates upon completion of the conversion to dial. A petition had been signed by more than 85% of the subscribers requesting an improved dial service and approving the rates in the application. The increase granted was not the rate requested by Minnesota Community Telephone Company but a change from their present rate of $3.25 for individual line business to $4.00. The new rates are to be effective upon the first billing following conversion to dial.

LINE WIRE and Strand

EXCEPTIONAL TENSILE STRENGTH

of Crapo HTL-135 and Crapo HTL-85 Telephone Line Wire provides these advantages:

- Longer spans
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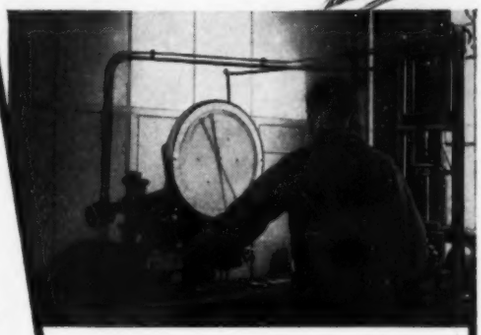

Samples of every production run of *Crapo* HTL-135 and *Crapo* HTL-85 Telephone Line Wire are tested on this equipment to insure that tensile strength meets specification.

Crapo HTL-135 and *Crapo* HTL-85 Telephone Line Wire and *Crapo* Galvanized Steel Guy Strand are available via Graybar. From Graybar you can also get top-quality lead-covered cable, hardware, and all the other items you need for line construction and maintenance. Give the Graybar Man near you a list of your needs. You can count on him to deliver the right materials, and his assistance will save you time. *Graybar Electric Company, Graybar Building, New York 17, N. Y.*

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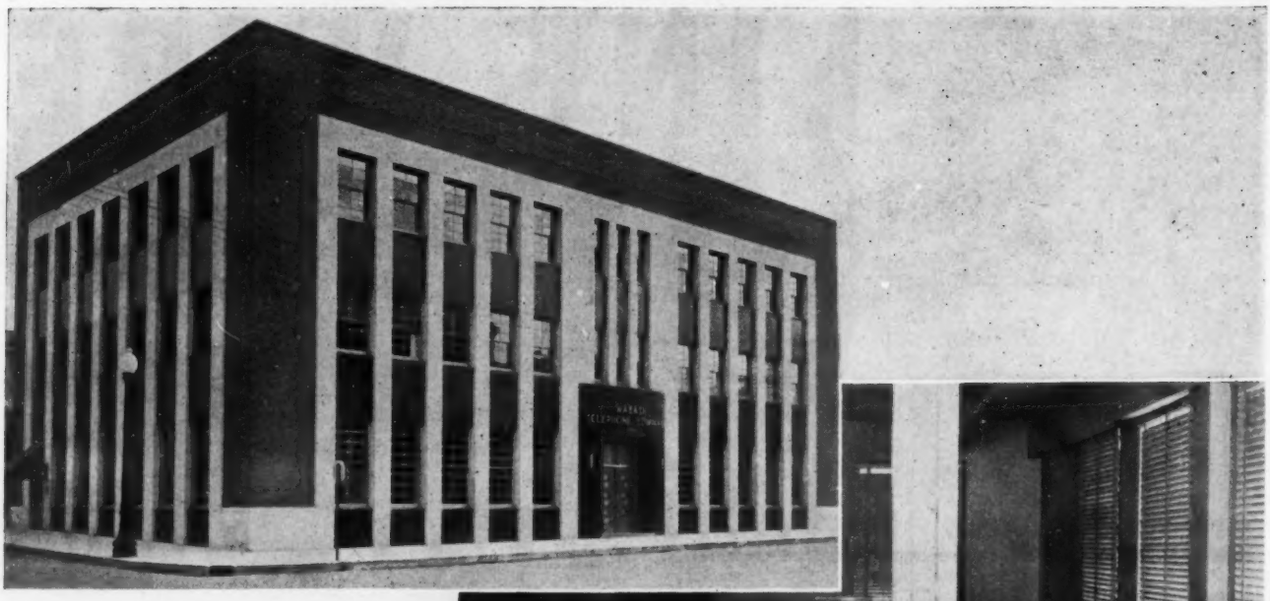


Central Office Building at Bloomington, Illinois

Toll and local test desks.

A PATTERN for TOMORROW

The Bloomington Automatic Exchange

By G. SORBER, Staff Engineer, Automatic Electric Sales Corp.

MANY a telephone man who today is pondering plans for a new central office to launch his company into a postwar program of improved service and increased operating efficiency can find inspiration and ideas almost without end in the new Bloomington, Illinois, office of the Wabash Telephone Company. A visit to this exchange suggests the thought that the telephone industry ought perhaps to consider an annual award for excellence in exchange design and construction—a telephone "Oscar," so to speak—in which event, the Bloomington exchange would undoubtedly be one of the current contestants for top place.

This splendid office is the materialized vision of the management of the Wabash Telephone Company—a Gary Group company—headed by V. E. Chaney, president, and R. B. Still, vice president and general manager. Since its opening, it has attracted the attention—together with no small degree of envy—of telephone men from all parts of the country. The central office building is one to which the company's management and the public alike can justly point with pride. Its business office would delight the "public relations sense" of any commercial manager. Its equipment reflects engineering techniques and operating efficiency which are well in advance of the times. The whole is an effective expression of what can be accomplished in the way of making pleasing design compatible with engineering realities and practical economy.

Building—A Civic Improvement

THE building itself is a magnificient structure of restrained modern design. Thoroughly utilitarian, it is at the same time architecturally distinctive, and a recognized civic improvement to Bloomington's downtown district. The first floor is given over entirely to commercial and business offices. These are designated quite evidently to conform to the view that a telephone commercial office should be a place where a customer can feel at home. Tastefully designed and decorated, the office is air-conditioned and completely equipped with every customer convenience, including writing desks, chairs, telephone booths, and a customer's room. On entering the commercial office, the visitor is faced with a pleasing group of landscape murals on the wall behind the cashier's desk. Modern soundproofing on the ceiling, and asphalt

Bloomington's Business Office

Switchroom, Showing 200-Line Finders

tile floors complete the impression of quiet efficiency and dignity.

Construction Began Prior Pearl Harbor

IT is in its technical aspects, however, that the Bloomington office finds its principal claim to interest among telephone men who are thinking in terms of tomorrow's needs. Several years before Pearl Harbor, the Wabash company began to lay plans not only for the construction of a new building, but also for the conversion of the exchange to Strowger Automatic. Before the war intervened, work had progressed far enough to permit completion of the building and the engineering and manufacture of a substantial amount of automatic switching equipment.

Future Needs of Exchange Provided for

AS a result, through the joint efforts of the engineering staffs of Automatic Electric Company and the Wabash Telephone Company, some 3,100 lines of automatic equipment were placed in service, representing rather more than half the total number of stations served out of Bloomington. This equipment is installed on the third floor of the building in a switchroom that might well excite the pride and enthusiasm of the most exacting equipment engineer. The ultimate capacity of the switchroom is about 10,000 lines—ample to care for the projected needs of the exchange for many years in the future. The switching equipment is of standard Strowger step-by-step type, using line finders and connectors which are both of the 200-line type. All switching equipment is mounted on high (11′ 9″) frames, thus providing a high degree of building space efficiency. Wide aisles between frames and smooth-running rolling ladders provide easy and instant access to all switches.

Other equipment in the switchroom includes a five-panel power board on which are mounted all fuses and controls for the telephone power plant as well as supervisory signal controls for the automatic switches; diverter pole generators for the efficient maintenance of switchboard battery voltage; multi-frequency generators for supplying harmonic ringing current; toll and local test desks of the most modern type; and the main distributing frame.

Line Cable Treatment

A NOVEL feature of the main frame, which is placed at the far end of the switchroom, is that the line cables, instead of leading up through the floor in the conventional manner, are taken up direct from the cable vault through a tile duct built out from the wall, and led over to the top of the frame, where they are fanned out on the line terminals. The weight of the suspended cables is taken by steel strand attached to a girder. This method has the advantages of avoiding holes in the floor under the frame and saving space that would otherwise be needed to accommodate cable leads through the floors below.

Electronic Dust Filter

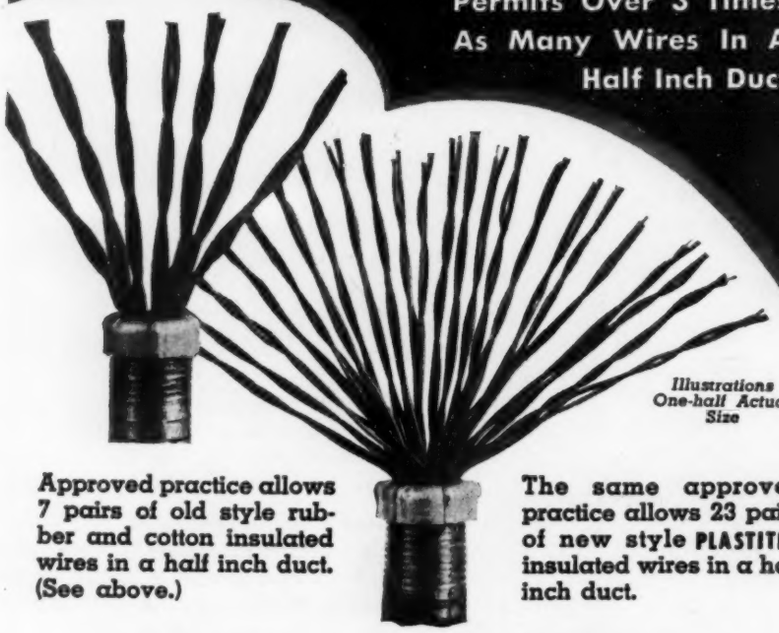
LIKE all other parts of the building, the switchroom is light, airy and immaculate. To help minimize dust, the walls are covered with glazed tile to the ceiling, and the floor is covered with asphalt tile which is kept waxed. Fresh air is drawn in through an electronic dust filter (Precipitron) in the penthouse, which not only adds to the comfort of employees but also aids in keeping the equipment clean.

Partial Conversion To Date

BECAUSE the conversion to automatic is so far only partial in character, a substantial number of lines still terminate in the old office nearby and are operated manually. It is well known that in large exchanges, partial conversions are often expedient for reasons of finance, since

Count 'em!

PLASTITE* Insulation Permits Over 3 Times As Many Wires In A Half Inch Duct



Illustrations One-half Actual Size

Approved practice allows 7 pairs of old style rubber and cotton insulated wires in a half inch duct. (See above.)

The same approved practice allows 23 pairs of new style PLASTITE* insulated wires in a half inch duct.

Saving Duct Space Saves Money

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- is a lower cost wire
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Order by Whitney Blake Catalogue No. 22S2, 22S3, 22S4

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THE WHITNEY BLAKE CO.

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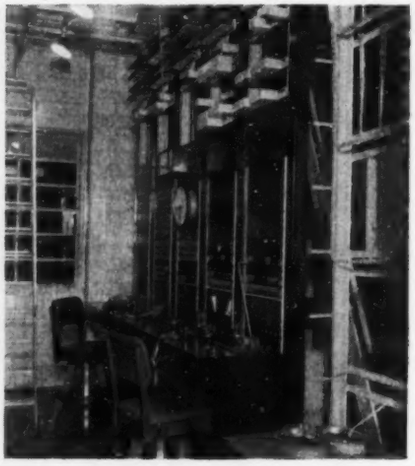
Well Built wires since 1899

they permit the retirement of older sections of the manual equipment while the later ones remain in service, and also permit the financial commitment for a conversion program to be spread over a term of years rather than to be undertaken all at once.



Toll Operating Room, Showing 16-Position Automatic Toll Board.

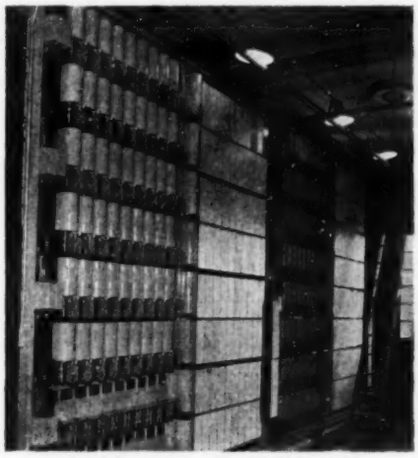
For these reasons, certain features of the Bloomington plan which coordinate the functioning of the remaining manual equipment with the new automatic switches may be of interest to others whose conversions may follow a similar pattern.

Calls which originate and terminate in the same office are, of course, handled as full automatic or straight manual calls, as the case may be. To permit completion of calls from automatic to manual subscribers with the greatest speed and without imposing any extra burden on the calling subscribers, call indicators have been installed on certain of the "B" operators' positions in the manual office. By this means, each manual number dialed by an automatic subscriber is set up visually on a display panel before the operator, who completes the connection in the usual way, using single ended cord circuits, and without need for talking with either called or calling subscriber.

For the completion of calls from manual to automatic subscribers, cordless "B" positions have been installed in the manual office. The cordless "B" operators complete such calls through the automatic switching equipment by means of keyset impulse senders. The release of these calls upon completion of conversation is automatically controlled by the manual "A" operators.

SINCE Bloomington is an important toll center, not only for other exchanges of the Wabash Telephone Company and the other nearby Gary

Group properties, but also for important long distance lines of the Bell System, careful study was made of the needs for toll switching facilities. As a result of these studies, the Bloomington exchange has been equipped with an automatic (cordless) toll board, also engineered and manufactured by Automatic Electric. This board, occupying its own room on the second floor of the building, consists of 16 control positions installed in a double row. The actual switching functions—on incoming, outgoing and through calls—are performed, not through conventional cord and jack equipment, but by automatic toll switches up in the main switchroom.



Line Relays and Line Finders.

These are controlled at the toll positions through simple key shelf equipment—the controls for each position consisting of link circuit lamps and keys, and a key type impulse sender.

The quiet air of efficiency in this toll room, broken only by the low murmur of voices, shows marked contrast to the noise and confusion that are characteristic of the conventional type of operation. To see the Bloomington toll operators at their duties is to appreciate at once how much this new method does towards reducing operator fatigue, saving time for the subscribers, and increasing the time efficiency of toll circuits.

Toll Switching Facilities Office Plan

ALSO on the second floor are the operators' quarters—restroom, locker room, kitchen facilities, etc.—the offices of general manager R. B. Still, and assistant general manager K. F. McKittrick, and the engineering department under the supervision of W. M. Driggs, general plant supervisor. The manager of the Bloomington exchange, H. L. Etes, has his office on the first floor at the left of the entrance into the commercial office, a location which is appropriate to the efficient handling of public relations matters.

Practical Ideals

MUCH could be told about other features of the Bloomington office which might well serve as functional ideals in any telephone building. There is the modern equipment in the basement for heating and ventilating, the provisions for employee comfort and convenience, the quiet, pleasing motifs in interior design and decoration. These things must be seen to be really appreciated. Far from representing frills, they are all directed towards the practical ideals of modern service and the greatest harmony between the company, its personnel, and the public they both serve —the whole plan reflecting the efficiency of private enterprise in public service.

The management of the Wabash Telephone Company — together with those who have worked with them in the design, construction, and operation of the Bloomington office—merit every commendation for a thoroughgoing job. Whatever the future may bring, the Bloomington exchange is ready—its "pattern for tomorrow" in the meantime serving as a useful guide for others whose plans are still in the making.

SUB-CYCLE

ASSURES TROUBLE-FREE RINGING SERVICE

Thoroughly tested to meet exacting requirements of operating companies. Can be depended upon to deliver a steady powerful ringing current.

Made In 6 Models

To carry loads ranging from small PBX to large central office. Rated output capacities 7½ watts to 45 watts.

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- Nothing to Adjust

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for Every Telephone NEED

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FOR TROUBLE-FREE LINE JOINTS

Nicopress

The complete splicing system for communication lines that will satisfactorily and economically meet all your requirements.

A FEW OF THE MOST POPULAR SIZE SLEEVES

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No. 31—DC Nicopress Tool

Buckeye Carries the Complete Line in Stock

BUCKEYE TELEPHONE and SUPPLY CO.
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WHY IS BUCKINGHAM FIRST CHOICE

For more than 45 years, men whose efficiency, comfort and safety depend in a large measure on the equipment they use, have preferred BUCKINGHAM Products above all others.

BUCKINGHAM (STEPHENS) Climbers, Belts, Straps, tools and other equipment, are made by experts. They include many exclusive improvements which make for greater comfort, safety and efficiency. Buckingham Equipment is now used by the U. S. Army and many public utility companies.

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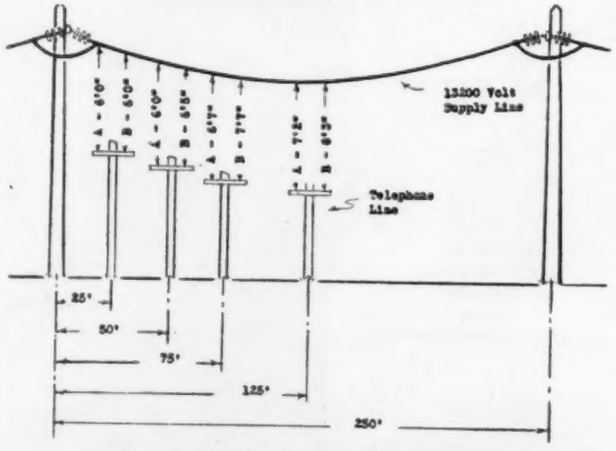
Telephone Engineer

HANDBOOK TABLES

Wire Clearances (Continued)



A = Large supply conductors - #6 solid copper, for example

B = Small supply conductors - #8 solid copper, for example

Fig. 2—Example of clearances to be obtained when a supply line of 13,200 volts and span length of 250′ crosses over a telephone line.

Index—Outside Plant Design
Date—May 15, 1945

Table No. 7—Sizes of Supply Conductors Classified as Small or Large for use in determining Minimum Clearances

Kind of Supply Conductor	A Large Conductor (Smallest Size of Wire)		B Small Conductor (Largest Size of Wire)	
	SOLID	STRANDED	SOLID	STRANDED
Amerductor		4 4-3 strand		6 4-7 strand
Copper	6	2-7 strand 4-A	8	
Copperweld	2	3-No. 8	4	6-A 3-No. 9
Galvanized Steel	2	4	4	6
A.C.S.R.		2		4

Example of method of determining Minimum Clearance between a telephone line and a supply line:

Referring to Figure 2, assume a 13200-volt single-phase supply line crosses over a telephone line. The span length of the supply line at the crossing is 225 feet. The distance from point of crossing to the nearer supply pole is 65 feet. The supply conductors are No. 2 solid copperweld. According to Table No. 5, No. 2 solid copperweld is classified as a large conductor (A). In the 225 feet section of Table No. 4, 65 feet is found to lie between 75 feet and 50 feet; hence the 75 feet figure is selected. The 13200 volt line falls in the 8700 to 50000 volt class; therefore reference is made to the "A" section of this column, and the minimum clearance is found to be 6′ 6″. Had the supply conductors been a No. 6 Amerductor for example, the line would have fallen in the small conductor or "B" class and the minimum clearance would have been 7′ 2″.

Kellogg Engineer Assigned to Army as Technical Representative

H. F. Timmins of the engineering department of Kellogg Switchboard & Supply Company has been named Technical Representative for the Army Air Forces through arrangements completed with the War Department.

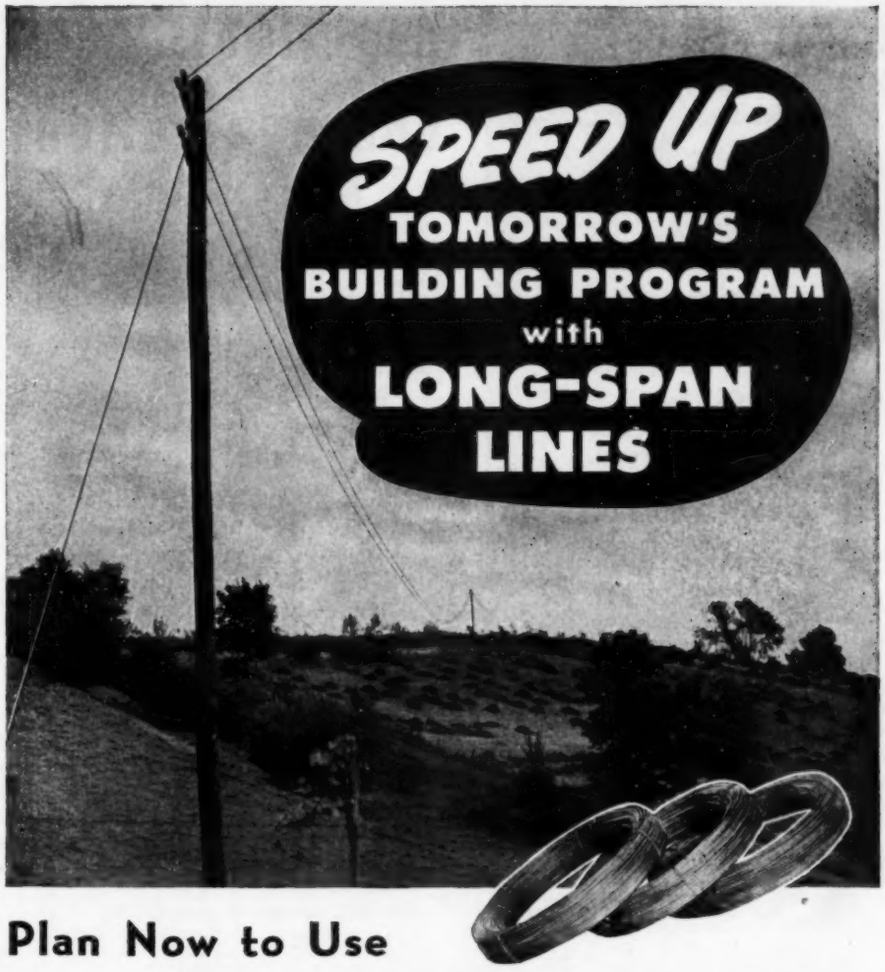
The duties of the technical representative are to report on various specified equipment while in actual combat operations. The work also involves giving assistance in the maintenance, installation, and operation of the technical equipment. The technical representative wears an officer's uniform but is minus the insignia.

H. F. Timmins

During this assignment Mr. Timmins will observe the Army Air Force communication equipment, especially that of Kellogg manufacture, and make reports directly to the War Department. This marks the second instance where an engineer of Kellogg Switchboard & Supply Company has been assigned to this important field work, which takes the engineer to various parts of the world where active combat is in progress. Mr. D. H. Erickson, another Kellogg engineer, has been serving the Signal Corps in this same capacity for a number of months.

Commission Declares Present Rates Unreasonable

The Dunnell (Minn.) Farmers Telephone Company is to use its new rates of $1.75 for business and residence individual lines ($1.25 old rates) effective April 30, as authorized by the Minnesota Railroad and Warehouse Commission. Upon investigation of the facts, the Commission declared the old rates unreasonable.



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FAR-REACHING, stored-up demands for rural telephone service can be met speedily and economically, after the emergency, with Crapo High-Tensile Line Wire. Long-span lines, made possible by Crapo HTL-85 and Crapo HTL-135 Line Wire, go up faster, require less labor and material, than lines of standard span length.

In planning tomorrow's program for the extension and rehabilitation of rural circuits, be sure to take full advantage of the superior physical characteristics of these wires!

Crapo HTL-85, with 60% greater tensile strength than standard B.B. wire, permits spans of 225 feet in heavy loading to 375 feet in light loading areas. Crapo HTL-135 possesses two and one-half times the strength of B.B., makes possible extra long spans of 350 feet in heavy loading, 500 feet in light loading districts. Both Crapo HTL-85 and Crapo HTL-135 provide superior tranmisssion at voice-frequency.

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Send today for Bulletins No. 201 and No. 202 containing physical, electrical and sag and tension data and construction practice information! Or, contact your distributor of Crapo Galvanized Telephone Wire and Strand.

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Send for folder and prices of this labor saving equipment.
SEYMOUR SMITH & SON, Inc.
483 Main St., OAKVILLE, CONN.

Highlights of the Communications News

(Continued from page 40)

for the companies and the employees. Panel chairman and public member Pearce Davis and public vice chairman Henry Meyer are exceptionally able and honest. The Bell and Independent industry members—Ohio Bell vice president Stephens and Central Telephone vice president R. A. Phillips for the Independent industry with his alternate members, Illinois Commercial vice president Louis Shepherd, Indiana Associated vice president Burton Saunders and Carolina Telephone & Telegraph president John Porter—have been serving long hours and are striving conscientiously for the best solution possible both for the industry and the employees. The two Panel labor members—"Jack" Moran, president of the Long Lines Federation of Telephone Workers, and "Bill' Dunn, who heads the Cincinnati Federation of Labor—are likewise most honest, fair and impartial in their consideration of the industry wage problems. In every respect, the National Telephone Panel is felt to be the most able and impartial in the National War Labor Board.

FCC Telephone Regulatory Activities Quiet

THE FCC has been doing very little in its telephone regulatory field lately.

It is anticipated that the requirement for the Independent industry to file continuing property record accounts will soon be postponed for another year because of the shortage of accounting and engineering employees due to the war.

During the first week in May, the staff group of the NARUC Committee, cooperating with the FCC on telephone regulation, met with the staff officials of the FCC to continue the studies of the Bell System license contracts. Both groups of staff members now are preparing reports for their respective Commissioners (Federal and State) on the results of the discussions.

Wage-Hour Division To Recommend Higher Minimum Wage

THE Wage-Hour Division will probably recommend to Congress a boost in the minimum wage—now 40 cents an hour for most industries involved in the war effort and a level which will be established under the Fair Labor Standards Act next October under the statutory provision. This indication of a recommendation for a legislative authorization for the higher minimum was given in the annual report of L. Metcalfe Walling, Administrator of the Wage-Hour and Public Contracts Divisions of the Labor Department.

Since the War Labor Board has set 50 cents as a minimum wage base to which wages may be voluntarily raised without Board permission and since most industries are now paying more than 40 cents an hour without any legal compulsion, the Wage-Hour Division feels the limit should be raised. The 40 cents an hour minimum established by the Fair Labor Standards Act of 1938 to become universal in employment under the Act after October, 1945, was reached by the communications industry committee more

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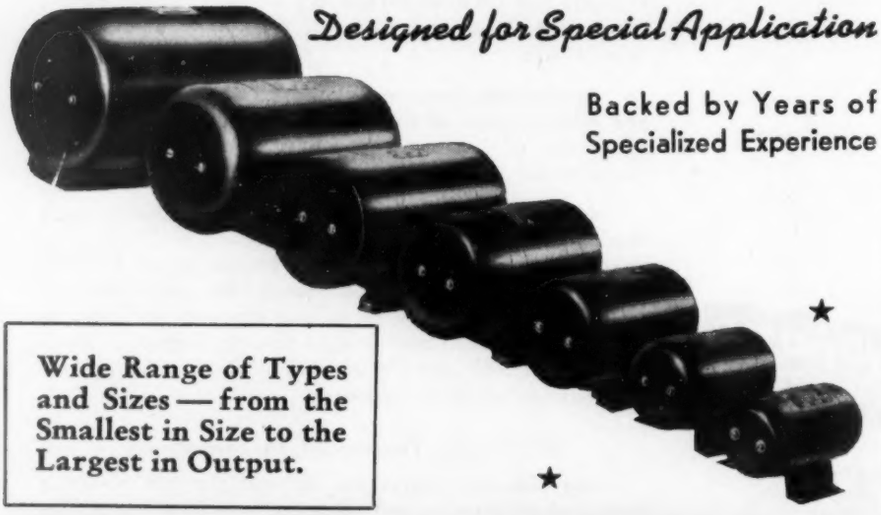

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than a year before this deadline on June 17, 1944.

Amendments to increase the length of the learning period of switchboard operators in the Independent industry and to increase the number of learners who might be employed at subminimum wage rates under special learner regulations were accepted after a hearing to the extent of increasing the subminimum wage rates for learners from 25 cents to 30 cents for the first 320 hours and 35 cents per hour for the next 160 hours of a 480-hour learning period for switchboard operators. Authority was also granted to issue certificates to the extent of an employer's proved need to meet abnormal labor turnover resulting from the war emergency.

The amended Wage-Hour Division regulations recognized the difference in the need for a subminimum rate for learners in large and small exchanges, learner certificates being denied to Independent exchanges of 2,000 or more stations unless the exchange could show that unusual circumstances made the issuance of a learner certificate necessary to prevent curtailment of opportunities for employment.

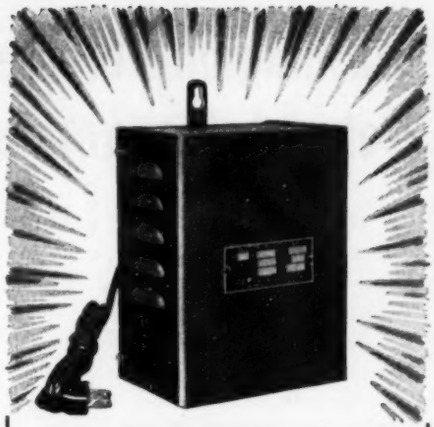
In spite of this authority, the report stated, there was a marked decline in the number of learner certificates issued during the fiscal year, due principally to the difficulty of obtaining learners at rates less than 40 cents an hour in an increasing number of tight labor markets and to the general rise in the wage which made a subminimum rate for learners unnecessary to prevent curtailment of opportunities for employment.

Errata

The breakdown of the Independent telephone companies, carried on page 18 of the May 1 FORTNIGHTLY TELEPHONE ENGINEER, was not furnished the OPA by the United States Independent Telephone Association. OPA sources had informed us that the material had been furnished by the Association, but it is now understood that the OPA itself had prepared the data from available statistics of the Independent industry.

Dakota Automatic Buys New Exchange

The Dakota Automatic Telephone Company of Fargo, N. D., of which T. P. Clifford of Mohall is manager, has purchased the telephone exchange for the towns of St. Thomas, Hoople and Crystal, North Dakota.



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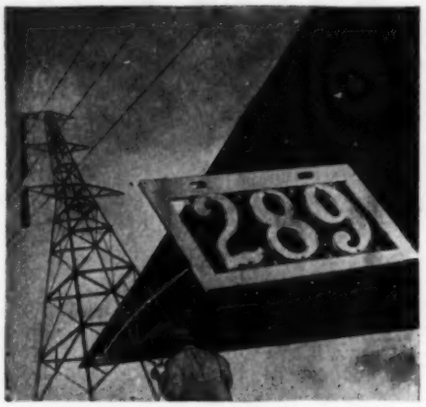

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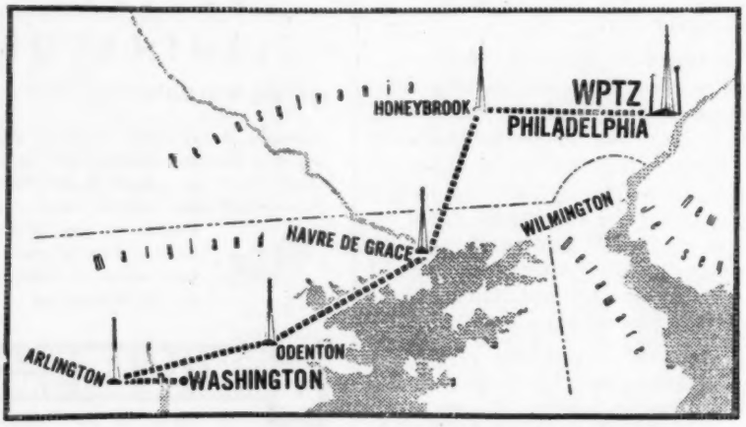
Washington-Philadelphia Television Network Inaugurated by Philco

THE first multiple-relay television network in the world linking two major cities is now in operation between Washington, D. C., and Philadelphia. Developed by Philco engineers, it gives a scientific demonstration that the transmission of a television picture over long distances by a series of wireless relays is possible and practical.

In this network, television pictures are relayed from Washington through booster stations at Arlington, Va., Odenton, Md., Havre de Grace, Md., and Honeybrook, Pa., to Philco Station WPTZ in Philadelphia and its television audience. This technique is the scientific forerunner of the means by which signals can be sent across the United States to form a nationwide television network.



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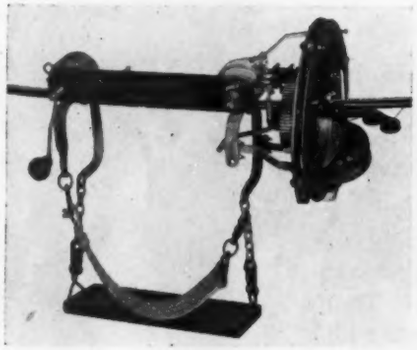

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OPA Opposes Illinois Allied Rate Increase Move

Contending that the Illinois Allied Telephone Co. is not eligible to apply for a new rate schedule within two years from the date of the Illinois Commerce Commission's order affecting the company's last application in October, 1944, and that there is a prior proceeding pending undetermined, the OPA Public Utilities Division, representing Economic Stabilization Director William H. Davis, is seeking leave to intervene and has asked the commission to dismiss the company's newest application, which is for some $30,000 of increased revenues through increased rates.

The Illinois Allied in 1943 had sought a $16,000 increase, but withdrew it after OPA intervention. The 1944 application sought $20,000 in increased rates, and after lengthy hearings the Illinois Commission handed down an order denying the increase in full, finding the company was earning 4% return under existing rates and holding such return to be sufficient "at this time." A company petition for a rehearing was granted, and the telephone company asked for still further increased rates in the rehearing, which OPA opposed. This latter boost also was rejected by the commission.

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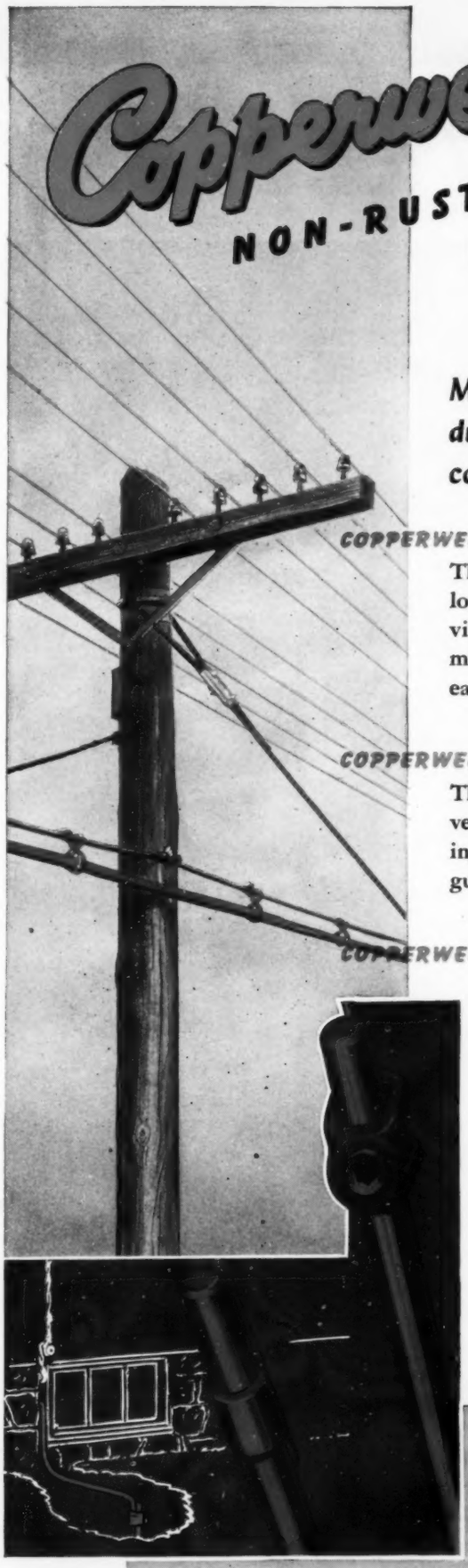
NON-RUSTING, LONG-LIFE

LINE WIRE
DROP WIRE
STRAND
GROUND RODS



Many telephone companies use Copperweld Products to reduce maintenance and replacement costs and to increase safety and dependability.

COPPERWELD *LINE WIRE*

The thick copper exterior with a core of high strength alloy steel permits long span construction—prevents corrosion and rust. Copperweld provides high conductivity and excellent voice and high frequency transmission characteristics. It is light in weight, small in diameter and is easy to string.

COPPERWELD *DROP WIRE*

The strongest drop wire made. Its core of high strength alloy steel prevents stretching and enables it to stay up under heavy ice and wind loadings. No. 17 AWG Copperweld parallel or twisted pair drop wire has a guaranteed breaking strength of 400 pounds, No. 18—340 pounds.

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Combines the permanence of copper and the strength of steel. The thick ductile copper layer will not crack, flake or peel. Serving, bending, or clamping will not harm Copperweld strand—thus assuring long life at low overall cost.

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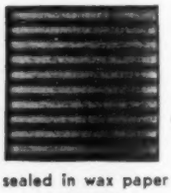

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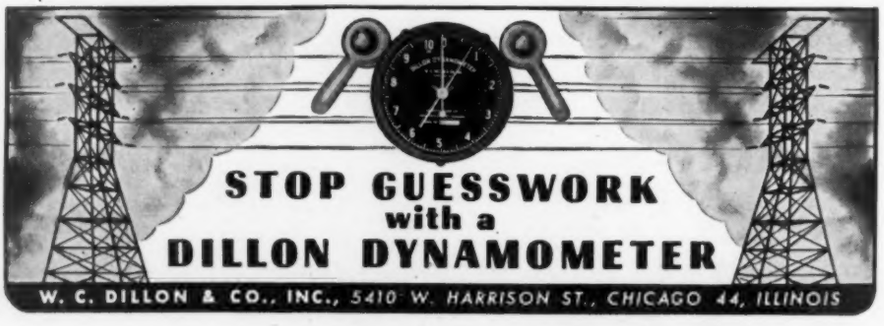

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Leeds & Northrup Pamphlet

An explanatory letter to present and future customers is being put out by Leeds & Northrup which in a friendly manner indicates the company's problems in war production and distribution directives and expresses the eagerness they feel for the day when they can control both the manufacture and shipments again to serve their customers.

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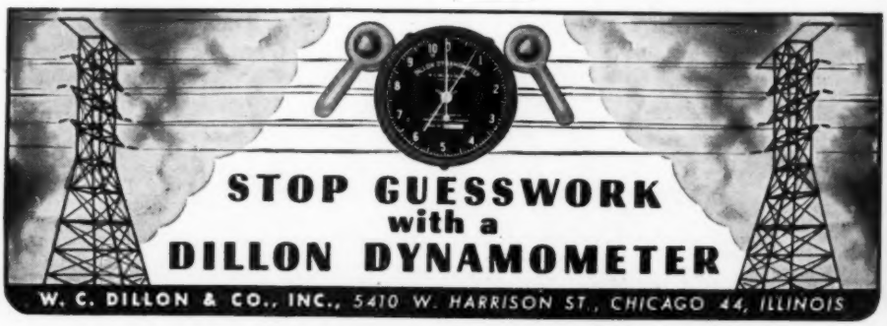

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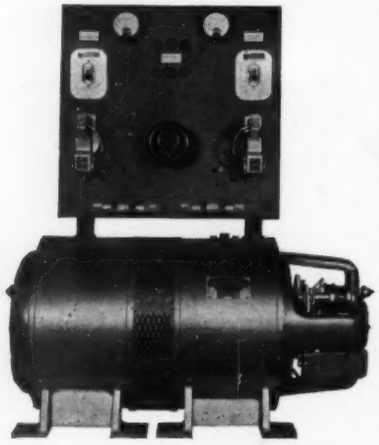
Keeps Telephone Exchange Batteries At Peak Efficiency —AT ALL TIMES—

Insures Maximum Battery Life and Reduces to a Minimum Battery Charging Costs



The Electric Products DIVERTER POLE Generator Sets, wherever installed, have universally earned the approval and confidence of Utilities engineers, for charging Telephone Exchange Batteries, because of the inherent characteristics to stay on duty at all times providing automatically, a safe, controlled floating charge and at the same time serving all exchange load requirements.

Some of the Diverter Pole inherent characteristics that insure this performance are:

- It maintains ***control of the exchange voltage*** well within high-low limits at all times.
- It constantly provides a ***closely regulated charging rate*** enough to compensate for losses and maintain the battery in a healthy fully charged condition.
- The Diverter Pole Generator ***is fully automatic in operation*** eliminating manual attention to charging and requiring only periodic inspection.
- It ***reduces to a minimum transmission of any noises*** to the circuit and ***is mechanically quiet.***
- By shifting all loads, beyond the safe capacity of the generator the Diverter Pole ***protects itself against any damaging overloads*** and is free from any characteristics of "running away" or reversal of polarity.

These inherent characteristics plus the special design, careful construction, and extensive field tests have insured maximum battery efficiency and life at minimum maintenance costs for over 20 years.

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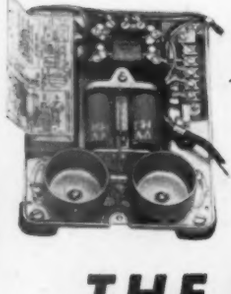

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